TASK FORCE "ABLE" REPORT

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RECOMMENDATIONS AND BROAD SYSTEMS

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INFORMATION RETRIEVAL TASK FORCE ABLE REPORT

INTRODUCTION

Leaders in government and industry are finding that the productivity of our civilization has by its very nature created an ever increasing technological problem. At present, the increasing amount of scientific and technical literature makes it impossible for scientists and technical workers to follow up on all of the new literature related to their fields. In addition the problems of acquisition, preservation, dissemination and bibliographic access to this literature are acute. Since scientific and technical research forms a large part of the work of the Department of Agriculture, we in agriculture must share in the solution to these problems.

The information retrieval Task Force ABLE (Agricultural Biological Literature Exploitation) was formed to study these problems and find a solution applicable to the field of agriculture. The task force was urged to consider the application of electronic computers to the storage and retrieval of information.

This report is presented with the philosophy that the advent of automation does not change the basic responsibility of any library. Automations' relationship to libraries is one of means and not purpose. The importance of this new tool is that new services are becoming economically feasible.

The main goal is that through automation, the National Agricultural Library may help to provide an intellectually stimulating environment for our research scientists as well as all library users.

RECOMMENDATIONS

1. The National Agricultural Library should establish a joint study group composed of library personnel, scientific specialists and the task force leader. They should study the results of the two questionnaires and interpret the needs of the scientist in terms of specific services, taking into consideration the variance in the diciplines.

2. The task force leader should work with the library staff to accomplish two goals: First, to automate immediately those functions which will produce a cost saving per unit of work. This may take the form of increased service for the same cost or savings in manpower which may be re-applied to increased service. Second, to use the suggestions of the above Study Group in developing the system specifications for the automation of the NAL.

3. The NAL should establish a position for one or more system analysts to define the details of the system specifications under the guidance of the task force leader from OMASD.

COMMENTS

In addition to the above recommendations the following is presented.

1. The greatest need of the NAL is a modern building to adequately house the present collection and provide space for future acquisitions.

2. The present manual methods of the NAL are very efficient and professional. Except for a few areas of high volume manual sorting, mechanization of the present work will not result in monetary savings.

3. The total worth of the new and increased service must be measured by the increased productivity of the library clientele, not by the increased expenditures. The only cost comparison that can be made is the cost of the new system versus what it would have cost to produce the new output under the old system.

4. It is not possible at this stage of development to determine the cost of the proposed system. A rough estimate of two million dollars for the complete systems and programming can be made based on the cost of other data processing systems of this magnitude.

5. It is advisable to begin work in automation before the details of the perfect system have been finished. To await the documentation of the perfect system before any movement toward it is to deter progress.

6. Possible areas for immediate automation are:

a. Author Index for Bibliography of Agriculture (already started)

b. Addition of a monthly subject index and production of the annual index for Bibliography of Agriculture.

c. Catalog card preparation including a machinable record for producing other products.

d. Production of Titles Indexed in B of A.

e. Update Subject Authority List

f. Selective Dissemination of Information system to include a customized Title Service by Journal and permuted Title index according to user profile.

g. Complete production of B of A, producing records to be used later in an information retrieval system.

h. Titles Received by NAL

i. Current Serial Records

j. Research Project files (CSESS, ARS, AMS)

This area-at-a-time approach will result in more realistic cost estimates. It will also facilitate the application of new methods and equipment into the total system.

7. Judging from the written comments on the scientists questionnaires, awareness of present library services available is also a problem. The small pamphlet of NAL services is apparently lost in todays deludge of high pressure advertising. Under the new administration of Research and Education there should be a program of educating the department scientists as to services available and how they can make better use of these services.

8. The new library should contain a positive inventory control of all library holdings. It is most discouraging for a person to be told that a much needed publication cannot be found and asked "does he want the library to search for it?"

INFORMATION RETRIEVAL

HISTORY OF THE TASK FORCE ABLE

Soon after Secretary Freeman was appointed, he inaugurated a pioneering effort in the Department -- "The Self-Survey." The "Self-Survey" approach to management improvements which the Secretary established in December of 1961, has proven to be an effective means of accomplishing efficiency and economy in Department operations. The "Self-Survey" concept becomes reality in the organization of the Task Force. Composed of a variety of specialists from agencies and staff offices, the Task Force is able to conduct evaluations of operating systems and to recommend improvements in program and management operations.

A good example of the results of the Task Force operation is the MODE project. MODE stands for Management of Objectives with Dollars through Employees. MODE was conceived, developed and implemented by employees drawn from every agency in the Department. When MODE is completely implemented, automatic data processing will be used to consolidate all Department payroll, and certain personnel and budget operations. This can reduce the cost of these services, one and 1/3 million dollars.

Another area of the MODE project is service to the Department and its employees. A computer center here in Agriculture will store exhaustive current information on 34,000 scientific, professional, executive and technical employees. This will be used to provide the fullest opportunity for equal and fair consideration for advancement.

The Office of Management Appraisal and Systems Development (OMASD) became active in the field of information retrieval late in 1961.

In March 1962 the Director of the National Agricultural Library (NAL) formally requested OMASD to make a feasibility study of the functions and services of the NAL to determine those which would lend themselves to automation. The request was:

"The Library would like to have your office make a feasibility study of the Library's functions and services to determine those which may lend themselves to automation.

"In addition, we would like to have a task force examine, in depth, those areas which they feel can be automated, and submit to the Library detailed plans for conversion, including procedures, types and costs of equipment, projected calendars of action, staff requirements, and estimated savings.

We have made some preliminary studies of some activities, and are particularly anxious for advice in the following areas:

1. Monthly Key Word in Context Index for the Bibliography of Agriculture.
2. Subject Headings Study to Combine Headings used in the Public Catalog and the Bibliography of Agriculture.
3. Charging and Discharging Materials on Loan.
4. Ordering, Receipting and Recording of Serials.
5. Storing and Retrieving Published Information for special bibliographic uses, with priority on agricultural economics literature.
6. Facsimile Transmission of Library Materials from both bound and unbound sources.
7. Coordination of suggested automation functions with other libraries to avoid duplication of effort.
8. Automatic shelf-reading.
9. Microstorage.

In addition, the NAL requested that a task force be set up to handle this project. OMASD agreed to direct the task force and secured the members from various agencies and the physical location from the NAL. OMASD also started the search for someone with ADP experience to direct the task force.

The membership was planned to be as follows:

No. Employees	Agency
2	Agricultural Research Service
2	Forest Service
2	Economic Research Service
1	Agricultural Stabilization and Conservation Service

Membership (cont.)

No. Employees	Agency
1	Soil Conservation Service
2	Agricultural Marketing Service
3	Land-Grant College
2	Library
1	Management Data Service Center
1	Office of Management Appraisal and Systems Development

As it turned out the task force was composed of:

No. Employees	Agency
4	Agricultural Research Service
1	Forest Service
2	Agricultural Stabilization and Conservation Service
2	Soil Conservation Service
2	Land-Grant College
2	Library
1	Office of General Counsel
1	Statistical Reporting Service
1	Office of Management Appraisal and Systems Development
1	Office of Information
1	National Bureau of Standards

The professions of the task force members were: entomologist, soil scientist abstractor, writer, lawyer, accountant, statistician, computer center director, computer systems analyst, and librarians from Forest Service, universities and the NAL.

The task force was launched with a series of meetings April 24 through 26, 1962. The Administrative Assistant Secretary of Agriculture presented the opening remarks followed by the Director and Assistant Director of OMASD. They discussed "The Task Force concept, its organization and objectives." The Director of the Library presented the NAL program for the benefit of the task force members.

Films were used to show graphically some of the progress in the information field. Talks by Library staff members dealt with different phases of information dissemination, with special reference to the NAL functions.

On April 25th Assistant Director of OMASD defined the Task Force objective. There is no written statement of the charge to the task force. He outlined three studies needed to approach the point where recommendations could be proposed. They were:

1. To find out what it is the research people want and what system can produce it.
2. To determine the design of a computing system that could efficiently handle the Library's information.
3. The costs of Library research under various systems.

It was also determined at this time that a final report would be required after the studies were completed. There was some discussion of the use to which the report would be put and whose approval was required before it could be released.

The Task Force was divided into four work groups: a Systems Requirements Group, a Systems Design Group, a Cost Group, and a Report Writing Group.

Functions of the first three Groups were outlined as follows:

A. Systems Requirements Group

1. Identify users
2. Visit and determine users' needs
3. Determine volumes of input and output
4. Determine conversion volumes
5. Give recommendations to over-all Task Force

B. Systems Design Group

1. Explore compatability requirements
2. Visit other installations
3. Lay out proposed system and review it with Task Force
4. Identify computer runs

B. Systems Design Group (cont.)

5. Lay out master tapes

6. Apply volumes to determine computer time

7. Furnish Cost Group with computer time and personnel requirements

8. Computer Schematics

9. Statement of System

C. Cost Group

1. Determine present costs of:

   a. Library functions

   b. Information systems in the agencies

2. Efficiency of present information operations

3. Costs of proposed systems and comparison with present costs

4. Agency costs in keeping its scientists informed

The Assistant Director of OMASD informed the group that Statistical Reporting Service, USDA, was scheduled to get a general purpose computer of high capability (probably installed by the Spring of 1963) and this presumably would take care of the Library's need for a computer.

During the next four weeks the task force operated without leadership. Several applicants considered the job but declined to take it. The task force members spent their time studying the literature available and making field trips to various related projects and equipment manufacturers. For a detailed account see the Section "Task Force Orientation and Information Retrieval Education". An impressive amount of verbal information was given to the task force by speakers from Central Intelligence Agency, National Library of Medicine, Library of Congress, Office of Science Information, N.S.F., Patent Office, Bureau of Standards, Office of Technical Services, Dept. of Commerce, ASTIA, University of Illinois, Remington Rand, IBM, General Electric, Documentation, Inc., CEIR, and other manufacturers.

The System Requirements Group designed a questionnaire, the Cost Group started work on the fiscal 1961 costs, and everyone had been studying this field which was entirely new to everyone on the task force.

On May 28 a Task Force leader was assigned to the project. He was new to the Information Retrieval field, his total experience having been in computer systems design and operations research. It took the newly assigned leader a month to find out what the project was all about and as mentioned before there was no clear statement of the charge to the task force. The lesson to be learned here is that the task force approach does not work efficiently unless the leader is assigned before the project starts.

The first two assignments of the Systems Requirements Group were worked upon first. It was decided that a representative sampling of USDA scientists would serve to express the needs of all the users of the Library. (It was found later that the actual distribution of NAL users was: USDA 68 percent, other U. S. Government 14 percent, Private and Commercial 18 percent, which supported the original assumption.)

4,463 names were selected for the population from which to draw a sample for the Survey of USDA Research Workers. The criteria for selection was: 1. "Research" is included in the description of the Civil Service class series code. 2. The worker's division or section was designated by his agency as primarily for research. 3. Grades GS-7 and above. Two questionnaires were designed.

The first questionnaire was to collect information on how scientists keep informed in research progress in their respective scientific fields. Fields of interest and age of scientific material was also to be collected through responses on a Specialty List enclosed with the questionnaire. This list was used by the National Science Foundation in maintaining the National Register of Scientific and Technical Personnel.

The second questionnaire was to assess the role that libraries, especially the National Agricultural Library and Associated Libraries, do or should play in getting information to scientists. The two questionnaires were mailed in September 1962.

To backtrack in the task force events, by the middle of July it was determined that the System Requirements Group would require many months to finish its assignments and it was not feasible to continue the Systems Design Group. The members of the task force were reassigned, some of them returning to their Agency with the understanding that they could be called back when they could be of assistance. All but two of those returned were later utilized as needed.

One of the original applicants for task force leader had started several people to flow charting the Library operations, but this effort soon ran into trouble because neither the task force members nor the Library staff had been trained in this type of work.

Three one-half day training sessions were held to give task force and Library staff members this training in Logic-flow charting. This combines the functions of flow charting where the movement of documents is charted with the functions of the logic of computer systems analysis, to determine the decision making patterns for each processing division.

There are two kinds of decisions: 1. yes, no; 2. high, =, low. In every job there are patterns of decision making and these must be combined with the actual flow of documents in order to make meaningful evaluations. The trouble with just flow charting is that it tells only what but seldom tells why some action is taken.

Through Logic-flow charting the work-flow-logic patterns are documented in such a way that in the future, systems analysts and programers will not have to cover the same ground.

The Cost Group continued as originally planned. They have identified the costs of the NAL for fiscal years 1961 and 1962. Administrative and support costs have been applied to the working sections and costs per unit of work have been calculated.

The activities of the Task Force were temporarily suspended when the Leader was detailed to a higher priority job, and the few remaining members returned to their agency. At mid-October 1963 the Task Force Leader returned to the Information Retrieval Project. On November 1, 1963 one Task Force member was called back for 5 months during which time the analysis of the questionnaires was completed. The special studies in volume 4, the broad systems design, and the author index problem definition were finished.

The task force report was presented to the Library and OMASD Administrator the last week of April 1964.

The cost of this study not including supplies, duplication or services of non USDA members is $52,926.17. The study was expected to utilize 84 man months of time, however only 59 man months were used. The study was expected to be completed within 6 months but was spread over two years.

BIBLIOGRAPHY OF AGRICULTURE - PROPOSED SYSTEM

In our proposed system, the B of A would be composed and printed from a magnetic tape using either a 1403 printer modified to provide upper and lower case letters and some special characters, or a photo-composition machine. The bibliographic citation would be composed as at present except that it would be typed on special paper, formated for input to an optical scanner. In addition to the citation, the record would also carry the source and the class and the subject heading tracings used in the index. Additional tracings could also be added so that deep indexing, which would actually not be printed in the B of A, would be available for computer searching, and bibliographies.

When one month's accumulation of citations were placed on magnetic tape, the citations would first be sorted by class and then alphabetized by author or other main entry. The citations and all tracings would then be numbered consecutively for printing each issue, as is done at present. Once numbered, the authors and subject headings would be written out on tapes for further sorting and printing of the author and subject indexes. All citations would be alphabetized and lines composed. If a photo-composition unit is used for the printing no further processing would be required on the computer. If the 1403 is used another program would compose the columns for a page and the entire page would be printed at one time, producing camera copy with no stripping or other hand processing unless special running heads are required of another type font. The author and subject pages would be produced in the same way. The pages would be photographed and reduced and plates made for photo-offset reproduction.

This system will make it possible to issue 12 citation issues a year instead of 11 and will also make it possible to include all indexes with each issue. One will not have to wait a whole year for a subject index.

Every three months, instead of printing an index to the single issue, the indexes to the previous two issues could be merged with the quarterly issue index and a cumulated quarterly index could be published. In the 12th issue, the previous three quarterly cumulations could be merged with the 10th, 11th and 12th issue indexes to publish a cumulated annual index. In other words, there would be no single issue indexes for the 3rd, 6th, 9th, and 12th issues. If desired, there could be a semi-annual cumulation, but the size of these various temporary cumulations would increase the printing costs to the point where it might become uneconomic. If even the cost of printing the three quarterly cumulations was not acceptable, the first 11 monthly issues would contain their own indexes and the 12th issue would contain the annual indexes.

After an issue has been composed, the monthly index on tape would be scanned and all outstanding bibliographies would be updated. It would be more economical to do this quarterly, especially for the less urgent bibliographies.

Once this monthly processing was completed, the citations would be added serially to the bibliographic tape which would have all the citations of the previous issues of the B of A, and the subject tracings would be added to the descriptor tape. The descriptor tape, unlike the tapes used to print out the individual and cumulated index issues, would be an inverted

file arrangement of individual descriptors. For example a subject heading which is printed:

Pinus sylvestris

planting

Sweden 73341

would appear on the descriptor tape as citation reference 64-73341 under Pinus, Sylvestris, planting, and Sweden. The entry can thus be searched at any level of specificity:

Pinus
Pinus sylvestris
Pinus planting
Pinus sylbestris planting
Pinus (in) Sweden
Pinus planting (in) Sweden
Pinus sylvestris planting (in Sweden
etc.

Once the monthly citation issues have been printed the citation tapes could be scratched. Once the cumulated index tapes have been printed, the individual monthly index tapes could be scratched. It is recommended that the annual index cumulations be retained so that special cumulations (three year, etc.) may be produced if desired. It could be desirable also to bring out checklists and translation lists covering long periods of time.

Copies of the descriptor tape should be made available to all cooperating institutions which have computer facilities to read the tapes. This would give each institution full capabilities for making all bibliographic searches. In time, these institutions could reciprocate by providing the NAL the bibliographic citations, in machine readable text, with their accompanying indexes of all of their own publications, providing that the NAL would accept the indexing done by others. This could reduce the workload of the NAL and make it possible for the staff to add other literature which now must be omitted because of lack of time and personnel.

It is anticipated that as the index is built up, that is, as more years of information are stored, equipment will be marketed which will make real time access practical.

It is estimated that the descriptor tape, ultimately a random file, would consist of about 30,000 records (descriptors) averaging 9 characters for each descriptor. Each citation would probably be referenced to about six descriptors for machine search. With the growth of the B of A, we estimate 250,000 citations per year. Each citation address will consist of 8 digits, two for volume and six for citation. The first year's cumulation of a descriptor file therefore, equals (30,000) x 9) plus (250,000 x 6 x 8) or about 12 1/4 million characters of addresses.

Each year about 3% more descriptors may be added. Actually, it should level off very rapidly and the number of descriptors may never exceed 35,000. Each year 250,000 citations would be added. Again, assuming each citation is referenced six times, the descriptor index will grow about 12 million characters a year. Or expressed differently, there will be a fixed quantity of about 300,000 characters for the descriptors and an annual increment of 12 million characters of addresses.

It is recommended that this system be implemented one step at a time. The author index has already been started and the detail system design follows this general section. The subject index should be the next step followed by the production of the complete bibliography. Finally the special bibliographies and information retrieval system.

13	ge fits	Total Cost per Year	Man Hours per Year
	9.56	$2,143.75	1002.1
	5.47	1,526.13	651.2
	3.96	200.08	93.5
	1.73	1,171.50	521.4
	1.09	2,738.89	1185.0
	2.47	752.07	263.0
	5.96	529.76	219.0
	4.08	1,205.09	521.4
	2.10	460.09	160.9
	0.16	3,012.26	1303.3
	7.39	535.88	120.7
	9.25	275.89	80.2
		$14,551.39	6,121.7
		3,673.16	
	OST	$18,224.55	

TASK FORCE ABLE - INFORMATION RETRIVAL

Preliminary Feasibility Study and Recommendation

Division of Indexing and Documentation

The preliminary tabulation and analysis of the questionnaires sent to the research scientists of the USDA indicate that the following library services are of the greatest value; a. Recent issues of journals or periodicals; b. Abstracting journals or services; c. Bibliographies and reference lists.

One of the ways the National Agricultural Library has of keeping these research scientists informed of pertinent journal articles is to increase the number of references in the Bibliography of Agriculture. One of the ways to increase the number of bibliographic citations with the present staff is to automate the purely clerical functions and apply the savings in man hours to increased citation production.

In addition to the problem of increased production the clerk typist shortage is becoming so acute that the Civil Service Commission is going to pay transportation requests to move clerk typists to the Washington area. Of the 19 clerical positions presently authorized in the Bibliography of Agriculture Section 5 are vacant, with no prospects in sight for filling. Thus the use of automation to save clerical man hours is most urgent.

It is estimated that 24,327 clerical man hours worth $52,192.07 can be saved and reapplied to the production of 23,300 additional citations over the next three years.

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Based upon the preceding reasons we recommend that the Personal Author Index of the monthly and annual issues of the Bibliography of Agriculture be automated in such a way that it will fit into the total systems concept of Information Storage and Retrival which we are developing.

CALCULATION OF SAVINGS IN DOLLARS

	1964	1965	1966	Total Savings Three Years
Production Costs Proposed System	$ 7,831.26	$ 10,257.05	$ 11,060.35	
Programing Costs, $12,000.00 Amortized over three years	4,000.00	4,000.00	4,000.00	
Total Proposed System	$ 11,831.26	$ 14,257.05	$ 15,060.35	
Projected Present System	24,888.88	32,892.46	35,559.39	
Difference in Savings	$ 13,057.62	$ 18,635.41	$ 20,499.04	$ 52,192.07

CALCULATION OF SAVINGS IN MAN HOURS

	1964	1965	1966	Total Savings Three Years
Man Hours Present System	8,242.1	10,891.2	11,773.8	
Man Hours Proposed System	1,754.5	2,318.8	2,506.9	
Difference in Savings	6,487.6	8,572.4	9,266.9	24,326.9

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13

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	2.47	752.07	263.0
	6.96	529.76	219.0
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	0.16	3,012.26	1303.3
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		$14,551.39	6,121.7
		3,673.16	
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THE PRESENT MANUAL SYSTEM

One 3" by 5" slip is made for each author from each reference slip after the reference slips have been numbered. The finished author slips are proofread. Slips with errors are sent to the original typist for corrections. A new proofreading is made of all corrections. As they are read the correct author slips are placed in one pile and the corresponding reference slips are placed in a separate pile.

There are three distinct steps involved in sorting the author slips. First a clerk sorts them on the first letter of the authors last name. Second, the author slips are completely alphabetized, and third, they are checked for accuracy by a proofreader or the clerical unit supervisor.

Each of the author slips is pasted onto the Master Sheet, one on top of the other so as to expose only the top line of print containing the author's name and citation number. This process is called shingling.

Page numbers must be placed on each page and a final proof check made before the material is sent to the lending department to be microfilmed. The microfilm copy is used as a check as to what the issue contains while it is being printed and serves as a back up copy in case the master sheets should be lost or destroyed.

The master sheets are sent to the Government Printing Office where they are photographed, reduced and the resulting negative

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inge nefits 14%	Total Cost per Year	Man Hours per Year
149.56	$2,143.75	1002.1
106.47	1,526.13	651.2
13.96	200.08	93.5
81.73	1,171.50	521.4
191.09	2,738.89	1185.0
52.47	752.07	263.0
36.96	529.76	219.0
84.08	1,205.09	521.4
32.10	460.09	160.9
210.16	3,012.26	1303.3
37.39	535.88	120.7
19.25	275.89	80.2
	$14,551.39	6,121.7
e	3,673.16	
COST	$18,224.55	

retouched prior to being used to burn plates for printing.

When the master sheets are returned, the author slips are stripped off the master sheets and the sequence reversed (due to the fact that in the shingling process the high order slips are pasted on top of the low order slips). The slips must then be interfiled with the previous months slips to reduce the lag time in preparing the annual author index.

The author slips for the October issue are back from the printer about the same time the November author slips are ready for use. The November issue does not have an author index as this would hold up the annual author index while the November authormaster sheets were at the printers.

The author slips are made into piles for a given last name since there may be many citations for the same author which must be placed in citation number sequence, within author name. They are separated from the next last name by crisscrossing the pile. They may or may not be in alphabetical order for the first and second name or initials of the author for that given last name.

The author slips are pasted onto long strips. Special care is taken that they are in the right order alphabetically down to the initials of the first and second names.

One or more of the indexers go over the author strips to cut out the names of identical authors to prevent repetition of

333

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149.56	$2,143.75	1002.1
106.47	1,526.13	651.2
13.96	200.08	93.5
81.73	1,171.50	521.4
191.09	2,738.89	1185.0
52.47	752.07	263.0
36.96	529.76	219.0
84.08	1,205.09	521.4
32.10	460.09	160.9
210.16	3,012.26	1303.3
37.39	535.88	120.7
19.25	275.89	80.2
	$14,551.39	6,121.7
	3,673.16	
COST	$18,224.55	

the authors name for each of the citation numbers. The slips are checked alphabetically and numerically and needed corrections are sent to the typist.

The clerical unit supervisor or one of her assistants corrects all errors found by the indexers and gives the strips a final proofing before the pages are made up. After making up the author index master pages with the shingling method the page numbers are added. A final check is then made of the master sheets, after which they follow the microfilming and printing process of the monthly author index.

After printing, the master sheets are returned and checked with the printed copy. When it has been established that the master sheets no longer are needed they are destroyed.

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149.56	$2,143.75	1002.1	
106.47	1,526.13	651.2	
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COST	$18,224.55		

THE PROPOSED SYSTEM

After the reference slips have been numbered the authors would be typed on continuous form pin feed paper on special typewriters which would become input to an optical scanner. Each line of print would be proofread by the typist before returning the carriage for the next line. If an error were found, the line delete symbol would be typed and the author typed correctly on the next line. This is expected to be the most economical way to hold the error rate down to a minimum without a complete proofreading of either the typed input or the printed computer output.

The typed author lists would be read by optical scanner and placed on magnetic tape. If the scanner is unable to recognize a character the entire line would be omitted from the magnetic tape, the line would be marked by the scanner and the page placed into a special pocket.

Those lines omitted by the scanner would be keypunched and verified, due to the possibility of unrecognizable characters in the correction batch which the optical scanner would not put on tape. The cards would be put on magnetic tape with the IBM 1401 which would also provide a method of entering corrections and emergency back up for the optical scanner.

The author records would be sorted by the IBM 7074 on name and citation number. Following the sort another 7074 program would compose the columns for the page and prepare line records.

,333

ringe enefits 7½%	Total Cost per Year	Man Hours per Year
149.56	$2,143.75	1002.1
106.47	1,526.13	651.2
13.96	200.08	93.5
81.73	1,171.50	521.4
191.09	2,738.89	1185.0
52.47	752.07	263.0
36.96	529.76	219.0
84.08	1,205.09	521.4
32.10	460.09	160.9
210.16	3,012.26	1303.3
37.39	535.88	120.7
19.25	275.89	80.2
	$14,551.39	6,121.7
e	3,673.16	
COST	$18,224.55	

The IBM 1401 would read the line records and print the pages of camera copy on special paper 15" by 22".

The annual author index would be prepared in the same way as the monthly, after merging the eleven monthly sorted author tapes. The final merge program would provide a means of entering corrections on a replacement basis.

,333			
ringe enefits 7½%	Total Cost per Year	Man Hours per Year	
149.56	$2,143.75	1002.1	
106.47	1,526.13	651.2	
13.96	200.08	93.5	
81.73	1,171.50	521.4	
191.09	2,738.89	1185.0	
52.47	752.07	263.0	
36.96	529.76	219.0	
84.08	1,205.09	521.4	
32.10	460.09	160.9	
210.16	3,012.26	1303.3	
37.39	535.88	120.7	
19.25	275.89	80.2	
	$14,551.39	6,121.7	
e	3,673.16		
COST	$18,224.55		

PROJECTION OF CITATION PRODUCTION

The projection of citation production is based on actual production for fiscal year 1963, actual budget projections for fiscal years 1964 and 1965 and the final goal of 200,000 citations by fiscal 1966. Calendar year figures are interpolated from the fiscal year figures as indicated by the following chart:

Actual fiscal 1963	Actual Budget Projections fiscal 1964	1965	Final Goal Fiscal 1966
104,000	110,000	170,000	200,000

Cal. 1964	Cal. 1965	Cal. 1966
140,000	185,000	200,000

Hourly production rates for most work elements are the standards used in budgeting. Stripping and Reversing, actual hours worked monthly were counted, averaged, and divided into the number of slips to derive the hourly production rate. Estimated leave and holidays were subtracted from man hours per year to give an actual figure of 1750 man hours per year. This figure was then used to calculate the hourly production rates. Thus it is not necessary to make any further allowance for leave and holidays.

Hourly salary rates are taken from the official salary table, and are for actual personnel most nearly associated with the particular work unit.

Some of the citations have more than one author. The 1.3 authors per citation is a well established figure used publicly and authoritatively. Charts showing the derivation of the

,333

ringe enefits 7½%	Total Cost per Year	Man Hours per Year
149.56	$2,143.75	1002.1
106.47	1,526.13	651.2
13.96	200.08	93.5
81.73	1,171.50	521.4
191.09	2,738.89	1185.0
52.47	752.07	263.0
36.96	529.76	219.0
84.08	1,205.09	521.4
32.10	460.09	160.9
210.16	3,012.26	1303.3
37.39	535.88	120.7
19.25	275.89	80.2
	$14,551.39	6,121.7
;e	3,673.16	
, COST	$18,224.55	

percentage of personal and corporate authors, are available.

Printing cost is for September 1963 issue. It was $1,689.63 for 1,595 copies, (NAL's order only, not GPO which is about 1,500 copies more). The September 1963 issue had 369 total pages.

AUTHOR INDEX PRODUCTION COSTS - PRESENT SYSTEM

Actual Costs Fiscal 1963 - 104,000 Citations - 135,200 Authors - 96.4% Personal = 130,333

		No. of Authors	Hourly Prod.	Hours per Item	Grade & Step	Hourly Rate	Cost per Month	No. of Months	Cost per Year	Fringe Benefits 7½%	Total Cost per Year	Man Hours per Year
Monthly:	Typing	11,848	130	91.1	3-4	$1.99	$181.29	11	$1,994.19	$149.56	$2,143.75	1002.1
	Proofing	11,848	200	59.2	4-4	2.18	129.06	11	1,419.66	106.47	1,526.13	651.2
	1st Sort	11,848	1400	8.5	3-4	1.99	16.92	11	186.12	13.96	200.08	93.5
	Alphabetize	11,848	250	47.4	3-6	2.09	99.07	11	1,089.77	81.73	1,171.50	521.4
	Shingling	11,848	100	118.5	3-7	2.15	254.78	10	2,547.80	191.09	2,738.89	1185.0
	Check & Correct	11,848	450	26.3	5-7	2.66	69.96	10	699.60	52.47	752.07	263.0
	Strip & Reverse	11,848	540	21.9	4-5	2.25	49.28	10	492.80	36.96	529.76	219.0
	Interfile	11,848	250	47.4	3-7	2.15	101.91	11	1,121.01	84.08	1,205.09	521.4
Annually:	Crisscross	130,333	810	160.9	5-7	2.66			427.99	32.10	460.09	160.9
	Shirgling	130,333	100	1303.3	3-7	2.15			2,802.10	210.16	3,012.26	1303.3
	Clipping	130,333	1080	120.7	11-3	4.13			498.49	37.39	535.88	120.7
	Misc.	130,333	1625	80.2	7-7	3.20			256.64	19.25	275.89	80.2
											$14,551.39	6,121.7

Printing of monthly and annual author pages: 325 authors per page. 802 pages at $4.58 per page 3,673.16
Based on 1595 copies

TOTAL COST $18,224.55

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AUTHOR INDEX PRODUCTION COSTS - PRESENT SYSTEM

Projected Costs Calender 1964 - 140,000 Citations - 182,000 Authors - 96.4% Personal = 175,448

		No. of Authors	Hourly Prod.	Hours per Item	Grade & Step	Hourly Rate	Cost per Month	No. of Months	Cost per Year	Fringe Benefits 7½%	Total Cost per Year	Man Hours per Year
Monthly:	Typing	15,950	130	122.7	3-4	$2.02	$247.85	11	$2.726.35	$204.48	$2,930.83	1,349.7
	Proofing	15,950	200	79.8	4-4	2.23	177.95	11	1,957.45	146.81	2,104.26	877.8
	1st Sort	15,950	1400	11.4	3-4	2.02	23.03	11	253.33	19.00	272.33	125.4
	Alphabetize	15,950	250	63.8	3-6	2.12	135.26	11	1,487.86	111.59	1,599.45	701.8
	Shingling	15,950	100	159.5	3-7	2.18	347.71	10	3,477.10	260.78	3,737.88	1,595.0
	Check & Correct	15,950	450	35.4	5-7	2.72	96.29	10	962.90	72.22	1,035.12	354.0
	Strip & Reverse	15,950	540	29.5	4-5	2.30	67.85	10	678.50	50.89	729.39	295.0
	Interfile	15,950	250	63.8	3-7	2.18	139.08	11	1,529.88	114.74	1,644.62	701.8
Annually:	Crisscross	175,448	810	216.6	5-7	2.72			589.15	44.19	633.34	216.6
	Shingling	175,448	100	1,754.5	3-7	2.18			3,824.81	286.86	4,111.67	1,754.5
	Clipping	175,448	1080	162.5	11-3	4.32			702.00	52.65	754.65	162.5
	Misc.	175,448	1625	108.0	7-7	3.35			361.80	27.14	388.94	108.0
											$19,942.48	8,242.1

Printing of monthly and annual author pages: 325 authors per page. 1080 pages at $4.58 per page 4,946.40
Based on 1595 copies

TOTAL COST $24,888.88

AUTHOR INDEX PRODUCTION COSTS - PRESENT SYSTEM

Projected Costs Calender 1965 - 185,000 Citations - 240,500 Authors 96.4% Personal = 231,842

		No. of Authors	Hourly Prod.	Hours per Item	Grade & Step	Hourly Rate	Cost per Month	No. of Months	Cost per Year	Fringe Benefits 7½%	Total Cost per Year	Man Hours per Year
Monthly:	Typing	21,077	130	162.1	3-4	$2.02	$327.44	11	$3,601.84	$270.14	$3,871.98	1,783.1
	Proofing	21,077	200	105.4	4-4	2.23	235.04	11	2,585.44	193.91	2,789.35	1,159.4
	1st Sort	21,077	1400	15.1	3-4	2.02	30.50	11	335.50	25.16	360.66	166.1
	Alphabetize	21,077	250	84.3	3-6	2.12	178.72	11	1,965.92	147.44	2,113.36	927.3
	Shingling	21,077	100	210.8	3-7	2.18	459.54	10	4,595.40	344.66	4.940.06	2,108.0
	Check & Correct	21,077	450	46.8	5-7	2.72	127.30	10	1,273.00	95.48	1,368.48	468.0
	Strip & Reverse	21,077	540	39.0	4-5	2.30	89.70	10	897.00	67.28	964.28	390.0
	Interfile	21,077	250	84.3	3-7	2.18	183.77	11	2,021.47	151.61	2,173.08	927.3
Anmually:	Crisscross	231,842	810	286.2	5-7	2.72			778.46	58.38	836.84	286.2
	Shingling	231,842	100	2,318.4	3-7	2.18			5,054.11	379.06	5,433.17	2,318.4
	Clipping	231,842	1080	214.7	11-3	4.32			927.50	69.56	997.06	214.7
	Misc.	231,842	1625	142.7	7-7	3.35			478.05	35.85	513.90	142.7
											$26,352.22	10,891.2

Printing of monthly and annual author pages: 325 authors per page. 1428 pages at $4.58 per page 6,540.24
Based on 1595 copies

TOTAL COST $32,892.46

AUTHOR INDEX PRODUCTION COSTS - PRESENT SYSTEM

Projected Costs Calender 1966 - 200,000 Citations - 260,000 Authors 96.4% Personal = 250,640

		No. of Authors	Hourly Prod.	Hours per Item	Grade & Step	Hourly Rate	Cost per Month	No. of Months	Cost per Year	Fringe Benefits 7⅓%	Total Cost per Year	Man Hours per Year
Monthly:	Typing	22,785	130	175.3	3-4	$2.02	$354.11	11	$3,895.21	$292.14	$4,187.35	1,928.3
	Proofing	22,785	200	113.9	4-4	2.23	254.00	11	2,794.00	209.55	3,003.55	1,252.9
	1st sort	22,785	1400	16.3	3-4	2.02	32.93	11	362.23	27.17	389.40	179.3
	Alphabetize	22,785	250	91.1	3-6	2.12	193.13	11	2,124.43	159.33	2,283.76	1,002.1
	Shingling	22,785	100	227.9	3-7	2.18	496.82	10	4,968.20	372.62	5,340.82	2,279.0
	Check & Correct	22,785	450	50.6	5-7	2.72	137.63	10	1,376.30	103.22	1,479.52	506.0
	Strip & Reverse	22,785	540	42.2	4-5	2.30	97.06	10	970.60	72.80	1,043.40	422.0
	Interfile	22,785	250	91.1	3-7	2.18	198.60	11	2,184.60	163.85	2,348.45	1,002.1
Anmually:	Crisscross	250,640	810	309.4	5-7	2.72			841.57	63.12	904.69	309.4
	Shingling	250,640	100	2,506.4	3-7	2.18			5,463.95	409.80	5,873.75	2,506.4
	Clipping	250,640	1080	232.1	11-3	4.32			1,002.67	75.20	1,077.87	232.1
	Misc.	250,640	1625	154.2	7-7	3.35			516.57	38.74	555.31	154.2
											$28.487.87	11,773.8

Printing of monthly and annual author pages: 325 authors per page. 1544 pages at $4.58 per page 7,071.52
Based on 1595 copies

TOTAL COST $35,559.39

AUTHOR INDEX PRODUCTION COSTS - PROPOSED SYSTEM

Projected Costs Calender 1964 - 140,000 Citations - 182,000 Authors 96.4% Personal = 175,448

		No. of Authors	Hourly Prod.	Hours per Item	Grade & Step	Hourly Rate	Cost per Month	No. of Months	Cost per Year	Fringe Benefits 7½%	Total Cost per Year	Man Hours per Year
Monthly:	Typing & Typist Proofing	15,950	100	159.50	3-4	$2.02	$322.19	11	$3,544.09	$265.81	$3,809.90	1,754.5
	Scanner Operator	15,950	6,365	2.51		2.33	5.85	11	64.35	4.83	69.18	
	Scanner Machine	15,950	6,365	2.51		24.80	62.25	11	684.75		684.75	
	Keypunch & Verify Unreadable Lines	55					5.50	11	60.50		60.50	
	1401 Card to Tape	55		.05		65.00	3.25	11	35.75		35.75	
	7074 Sort	15,950		.10		154.00	15.40	11	169.40		169.40	
	7074 Form Lines	15,950		.06		154.00	9.24	11	101.64		101.64	
	1401 Print Pages	15,950		.14		65.00	9.10	11	100.10		100.10	
Annually	7074 Merge A.	175,448		.14		154.00			21.56		21.56	
	7074 Merge B.	175,448		.07		154.00			10.78		10.78	
	7074 Form Lines	175,448		.33		154.00			50.82		50.82	
	1401 Print Pages	175,448		.86		65.00			55.90		55.90	
											$5,170.28	1,754.5
	Printing of monthly and annual author pages: 581 pages at $4.58 per page based on 1595 copies										2,660.98	
										TOTAL COST	$7,831.26	

AUTHOR INDEX PRODUCTION COSTS - PROPOSED SYSTEM

Projected Costs Calender 1965 - 185,000 Citations - 240,500 Authors 96.4% Personal = 231,842

		No. of Authors	Hourly Prod.	Hours per Item	Grade & Step	Hourly Rate	Cost per Month	No. of Months	Cost per Year	Fringe Benefits 7½%	Total Cost per Year	Man Hours per Year
Monthly:	Typing & Typist Proofing	21,077	100	210.77	3-4	$ 2.02	$425.76	11	$4,683.36	$351.25	$5,034.61	2,318.8
	Scanner Operator	21,077	6,365	3.31		2.33	7.71	11	84.81	6.36	91.17	
	Scanner Machine	21,077	6,365	3.31		24.80	82.09	11	902.99		902.99	
	Keypunch & Verify Unreadable Lines	73					7.30	11	80.30		80.30	
	1401 Card to Tape	73		.05		65.00	3.25	11	35.75		35.75	
	7074 Sort	21,077		.11		154.00	16.94	11	186.34		186.34	
	7074 Form Lines	21,077		.07		154.00	10.78	11	118.58		118.58	
	1401 Print Pages	21,077		.17		65.00	11.05	11	121.55		121.55	
Annually	7074 Merge A.	231,842		.15		154.00			23.10		23.10	
	7074 Merge B.	231,842		.08		154.00			12.32		12.32	
	7074 Form Lines	231,842		.42		154.00			64.68		64.68	
	1401 Print Pages	231,842		1.12		65.00			72.80		72.80	
											$6,744.19	2,318.8

Printing of monthly and annual author pages: 767 pages at $4.58 per page based on 1595 copies 3,512.86

TOTAL COST $10,257.05

AUTHOR INDEX PRODUCTION COSTS - PROPOSED SYSTEM

Projected Costs Calender 1966 - 200,000 Citations - 260,000 Authors 96.4% Personal = 250,640

		No. of Authors	Hourly Prod.	Hours per Item	Grade & Step	Hourly Rate	Cost per Month	No. of Months	Cost per Year	Fringe Benefits 7½%	Total Cost per Year	Man Hours per Year
Monthly:	Typing & Typist Proofing	22,785	100	227.85	3-4	$ 2.02	$460.26	11	$5.062,86	$379.71	$5,442.57	2,506.9
	Scanner Operator	22,785	6,365	3.58		2.33	8.34	11	91.74	6.88	98.62	
	Scanner Machine	22,785	6,365	3.58		24.80	88.78	11	976.58		976.58	
	Keypunch & Verify Unreadable Lines	79					7.90	11	86.90		86.90	
	1401 Card to Tape	79		.05		65.00	3.25	11	35.75		35.75	
	7074 Sort	22,785		.11		154.00	16.94	11	186.34		186.34	
	7074 Form Lines	22,785		.07		154.00	10.78	11	118.58		118.58	
	1401 Print Pages	22,785		.18		65.00	11.70	11	128.70		128.70	
Annually:	7074 Merge A.	250,640		.15		154.00			23.10		23.10	
	7074 Merge B.	250,640		.09		154.00			13.86		13.86	
	7074 Form Lines	250,640		.45		154.00			69.30		69.30	
	1401 Print Pages	250,640		1.21		65.00			78.65		78.65	
											$ 7.258.95	2,506.9

Printing of monthly and annual author pages: 830 pages at $4.58 per page based on 1595 copies 3,801.40

TOTAL COST $11,060.35

CALCULATION OF RUNNING TIME-PROPOSED AUTHOR INDEX
Calander 1964
IBM Table X22-6785-3 IBM 7074 with 729IV Tapes

Run No.	File Name	Char. per Record	No. of Records	Char. per Block	Rcds. per Block	No. of Blocks	Minutes per 100 Blocks	Minutes per File	Channel	Minutes Library & LBLCK	Minutes per Run	Hours per Run	Runs per Year	Hours per Year
II A	Merge Output	40	175,448	2,000	50	3,509	.0655	2.298	0 & 1	6.0	8.298	.13830	1	.13830
II B	Merge Output	40	175,448	2,000	50	3,509	.0655	2.298	0 & 1	2.0	4.298	.07163	1	.07163
III A	Merged Rcds, Input	40	15,950	2,000	50	319	.0655	.209	0					
	Print Lines, Output	135	3,190	1,350	10	319	.0481	.153	1					
	Estimated Process Time at .1 minutes per thousand authors							1.600		2.0	3.600	.06000	11	.66000
III B	Merged Rcds, Input	40	175,448	2,000	50	3,509	.0655	2.298	0					
	Print Lines, Output	135	29,242	1,350	10	2,925	.0481	1.406	1					
	Estimated Process Time at .1 minutes per thousand authors							17.540		2.0	19.54	.32567	1	.32567

CALCULATION OF RUNNING TIME - PROPOSED AUTHOR INDEX

Calander 1965

IBM Table X22-6785-3 IBM 7074 with 729IV Tapes

Run No.	File Name	Char. per Record	No. of Records	Char. per Block	Rcds. per Block	No. of Blocks	Minutes per 100 Blocks	Minutes per File	Channel	Minutes Library & LBLCK	Minutes per Run	Hours per Run	Runs per Year	Hours per Year
II A	Merge Output	40	231,842	2,000	50	4,637	.0655	3.037	0 & 1	6.0	9.037	.15062	1	.15062
II B	Merge Output	40	231,842	2,000	50	4,637	.0655	3.037	0 & 1	2.0	5.037	.08395	1	.08395
III A	Merged Rcds, Input	40	21,077	2,000	50	422	.0655	.276	0					
	Print Lines, Output	135	4,216	1,350	10	422	.0481	.203	1					
	Estimated Process Time at .1 minutes per thousand authors							2.108		2.0	4.108	.06847	11	.75317
III B	Merged Rcds, Input	40	231,842	2,000	50	4,637	.0655	3.037	0					
	Print Lines, Output	135	38,641	1,350	10	3,862	.0481	1.858	1					
	Estimated Process Time at .1 minutes per thousand authors							23.18		2.0	25.18	.41967	1	.41967

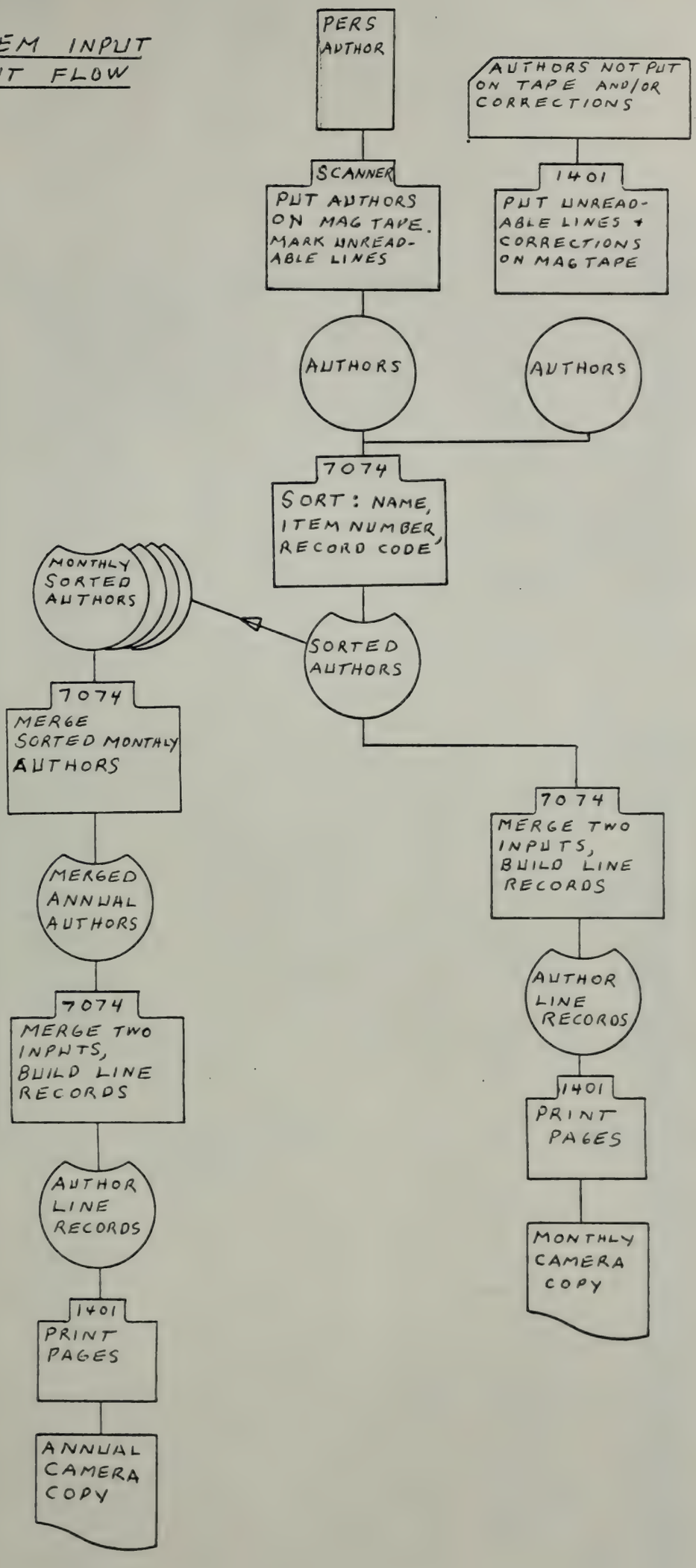
CALCULATION OF RUNNING TIME - PROPOSED AUTHOR INDEX

Calander 1966

IBM Table X22-6785-3 IBM 7074 with 729IV Tapes

Run No.	File Name	Char. per Record	No. of Records	Char. per Block	Rcds. per Block	No. of Blocks	Minutes per 100 Blocks	Minutes per File	Channel	Minutes Library & LBLCK	Minutes per Run	Hours per Run	Runs per Year	Hours per Year
II A	Merge Output	40	250,640	2,000	50	5,013	.0655	3.284	0 & 1	6.0	9.284	.15473	1	.15473
II B	Merge Output	40	250,640	2,000	50	5,013	.0655	3.284	0 & 1	2.0	5.284	.08807	1	.08807
III A	Merged Rcds, Input	40	22,785	2,000	50	456	.0655	.299	0					
	Print Lines, Output	135	4,557	1,350	10	456	.0481	.219	1					
	Estimated Process Time at .1 minutes per thousand authors							2.279		2.0	4.279	.07132	11	.78452
III B	Merged Rcds, Input	40	250,640	2,000	50	5,013	.0655	3.284	0					
	Print Lines Output	135	41,774	1,350	10	4,178	.0481	2.010	1					
	Estimated Process Time at .1 minutes per thousand authors							25.064		2.0	27.064	.45107	1	.45107

SYSTEM INPUT
OUTPUT FLOW



Sample input to Optical Scanner

040952 MERRITT E S
040953 MOFFATT B W
040954 MORENG R E
040954 THORNTON P A
040955 NORDSKOG A W
040955 FESTING M
040956 OHH B K
040957 ONISHI N
040957 MIYAZONO Y
040958 ONISHI N
040958 KATO Y
040958 MIYAZONO U
040958 TAKETOMI M
040959 PASVOGEL M W
040959 KURNICK A A
040959 HINDS H B
040960 PATRICK H
040960 VOITLE R A
040960 HYRE H M
040960 MARTIN W G
040961 ROWELL J G
040961 COOPER D M
040962 SANG J H
040963 SASAKI T
040963 HOSODA T
040963 KANEKO T
040963 MOGI K
040964 SCHINDLER H
040964 NEVO A
040965 SHANNON W G
040965 ARMOUR D M
040966 SHANNON W G
040967 SKALLER F
040968 STRAIN J H
040968 NORDSKOG A W
040969 STROUN M
040969 STROUN-GUTTIERES- H
040960 STROUN-GUTTIERES- L
040969 ROSSI-ROESGEN L
040969 ROSSI J
040969 STROUN J
040970 SUSCHKA AL
040970 SUSCHKA A
040971 THRONBER C
040972 TINDELL D
040973 TRAIL J C M
040974 TRAIL J C M
040975 WALLACE M C
040976 WILCOX F H
040976 CHERMS F L
040976 VANVLECK L D
040976 HARVEY W R
040976 SHAFFNER C S
040977 ADAMS R L
040977 ANDREWS F N
040977 ROGLER J C
040977 ROGLER J CH
040977 CARRICK C W
040978 AITKEN J R
040978 HUNSAKER W G
040978 LINDBLAD G S

NATIONAL AGRICULTURAL LIBRARY
PERSONAL AUTHOR INDEX
PROBLEM DEFINITION

PART 1. SYSTEM NARRATIVE

Typed author lists will be read by an optical scanner and written on magnetic tape. If the scanner is unable to recognize a character, the entire line will be omitted from the tape, the line will be marked by the scanner and the page placed in a special pocket.

Those lines omitted by the scanner will be keypunched and verified. The cards will be put on magnetic tape with the IBM 1401 which will also provide a method of entering corrections, and emergency back up for the optical scanner.

The author records will be sorted on the IBM 7074 by name, citation number and record code. Following the sort another 7074 program will compose the columns for the page and prepare line records. The 1401 will read the line records and print the pages of camera copy on special paper 16-1/2 by 22 inches.

The annual author index will be prepared in the same way as the monthly, after merging the eleven monthly sorted author tapes. See system input output flow.

PART 2. DETAILED PROGRAM DEFINITION

AUTH 099

1. PURPOSE AND SCOPE - (1401)

   A. Function - Card to tape.

   B. Frequency - Monthly.

   C. Estimated Volume - 200 records per month.

   D. Input - Author correction cards.

   E. Output - Author correction records.
   This tape will be low density, blocked 80 character records, 12 records to a block. File 0009920

AUTH 100

1. PURPOSE AND SCOPE - (7074)

   A. Objective - This is an unmodified sort which receives records.

   B. Frequency - Monthly

   C. Estimated Volume - 16,000 to 22,000 per month.

   D. Input - Author records, 40 characters per record, low density, blocked 24 records to a block. File 0009920

   E. Output - Sorted Author records, 40 characters per record, high density, blocked 50 records to a block. File 0010090

2. PROCESSING METHOD AND DATA DEFINITION

   A. Sort Sequence

Major	- Name	- word 2, pos 4-9 words 3,4,5,6 word 7, pos 0-3
1st minor	- Item number	- word 1, word 2, pos 0-1
2nd minor	- Record code	- word 2, pos 2-3

3. QUALITY CONTROL

   A. Hash Accumulation

      1. Input - none

      2. Output File 0010090
         Field 3 - Record Count

AUTH 110

1. PURPOSE AND SCOPE (7074)

   A. Objective - This is an unmodified merge which receives sorted monthly author records. There will be 11 or more tapes to be merged which will require running the program several times to get one final output.

   B. Frequency - Yearly.

   C. Estimated Volume - Each of the eleven input tapes will contain 16,000 to 22,000 for a total of 176,000 to 242,000 records.

   D. Input - Sorted Author records, 40 characters per record, high density, blocked 50 records to a block.
   File 0010090

   E. Output - Same as input. File 0011090

2. PROCESSING METHOD AND DATA DEFINITION

   A. Merge Sequence

   Major - Name - word 2, pos 4-9
   words 3,4,5,6
   word 7, pos 0-3

   1st minor - Item number - word 1,
   word 2, pos 0-1

   2nd minor - Record code - word 2, pos 2-3

3. QUALITY CONTROL

   A. Hash Accumulation

   1. Input File 0010090
      Field 3 - Record Count

   2. Output File 0011090
      Field 3 - Record Count

AUTH 120

1. PURPOSE AND SCOPE (7074)

A. Objective - This program receives sorted Author records and places them in columes 24 characters wide. If the name exceeds 17 characters two lines of print are built. If there are two or more records with the same name the numbers will be condensed into the fewest lines possible. Five columns will be gathered to make a complete page of authors and line records are written.

B. Frequency - Monthly and yearly

C. Estimated Volume

1. Monthly 16,000 to 22,000

2. Yearly 176,000 to 242,000

D. Inputs

1. Author input - Sorted Author records, 40 characters per record, high density, blocked 50 records to a block. File 0011090

2. Correction input - same as above

E. Output - line records, 132 characters of print plus carriage control. High density, blocking to be determined by programmer. File 0012141

2. PROCESSING METHOD AND DATA DEFINITION

A. Record Identification - Word 2 pos 2-3 contains "Record Code" field. Codes are: Blank - Normal record
A - Addition record
D - Deletion record

B. Special Card input - Provide for a single card input to contain the month and year in col 1-4. Subtract 36 from the year to get the volume number. The month spelled out, the year in four digits and the volume number will be placed into the heading line. If the month is blank leave the month out of the heading and shift the year to the left.

C. Merge Inputs - Alteration switch one on, provides for a correction input which is merged with the Author Records. The record format of both inputs is identical and the correction input may be used to merge two tapes of normal Author Records.

2. If the "SAME NAME" switch is off, this is the start of a sequence of two or more records with the same name. The rest of this leg determines how long the name is and how many lines it will require. If 2 or more blanks are found, the characters to the right are assumed to be blank. If the name is longer than 17 characters it must be printed on two lines. Positions 9-18 are checked for a single blank to divide the name. The "CONT" switch will be explained in the "COLUMNS" routine. A 24 position work area is used to compose the first and second line which will contain the name and one or more item numbers.

   The "FIRST LINE" switch is turned on when the first line is filled. If the name will fit on the first line, this line is moved to the column immediately. If the name takes two lines, neither line is moved to the column until they are both filled or a new name occurs.

3. When the "SAME NAME" switch is on, the name has already been placed in the work areas and only the number needs to be moved. If the "FIRST LINE" switch is off, there is still room in the first line. When the "FIRST LINE" switch is on, the number must be moved to the second line. The "SECOND LINE" routine locates the next blank space and moves the number. When the second line is filled it is moved to the column and blanked and more item numbers can be moved to the second line work area. If there are less than three item numbers on the second or subsequent lines they must be shifted to the right. This is done by the "SECOND LINE SHIFT" switch. Note that position 4 or 11 of second line work area must be blank so there will be a blank between characters in positions 3 and 10 and the item number to be put in positions 5-10 or 12-17.

2. <u>High results on "NAME" field</u>

   a. If the "SAME NAME" switch is off this is a single item and there will be no additional item numbers.

   b. If the "SAME NAME" switch is on this is the <u>last</u> of a series of two or more records with the <u>same</u> name. If the "FIRST LINE" switch is off there is still room in the first line. When the "FIRST LINE" switch is on the number must be moved to the

D. Processing before the sequence check

1. Move work routine

Later in the program the Delection and Duplicate routines drop records by blanking the "Name" field, char. 1-3 and moving another record over the dropped record. In addition if a record is blank in "Name" char. 1-8 the record is dropped. The work areas are filled with the first records with the "MOVE WORK" routine also. The last record is forced out by this routine also.

2. Letter Breaks - Each group of names with the same first letter is started with that letter printed in the middle of the column. If this comes in the middle of the column there are two blank lines above and below the letter. If it occurs on the first line of a column the two blank lines are only after the letter. If it occurs near the end of the column there must be 7 lines left, otherwise the column is left blank and the letter is put on the first line of the next column. The return from the "LETTER" routine is to "LETTER SWITCH" to check the next record as there might be just one author for any one letter such as "Q, X, Y, Z.

E. General Processing in the Merge

This program is built around the sequence check of the merge. The "WORK 1" area contains the current low merged record while the "WORK 2" area contains the previous low record. Neither record has been processed at the time the comparison occurs.

F. Decisions made after Comparison of "WORK 1" to "WORK 2"

1. Equal Results on "NAME" field

a. If the number is also equal, this is either a matched delection or a duplicate. If a duplicate "WORK 1" is dropped by getting another record over it. If a matched deletion, both records are dropped by blanking "NAME" char 1-3 and getting another record.

b. If the number is high there are several possible conditions:

1. If "WORK 1" record code is a "D", the "WORK 1" record is an unmatched deletion and is dropped.

second line. The "SECOND LINE" switch determines the shifting of a number in the second line if these are only two numbers.

3. Low results on "NAME" field. - This indicates that either the input is out of sequence or this programs' merge routine is incorrect. In any case processing can not be continued.

G. Additional routines

1. "COLUMNS" - When the first line, second line or both work areas are filled this routine is entered. The heading switch is off at the start of the program and will be turned on in the "LETTER" routine by the first record. Finishing a page in the "PUT LINE" routine turns it off which heads up a new page the next time the "COLUMNS" routine is entered.

   a. "COLUMN SWITCHES" - These control the moving of the lines to the proper column and the "COLUMN LINE COUNTERS" may be used to index the moving of the line to the proper line within the column. Notice that the heading and page number lines do not affect the line counters.

   b. Last line. Just before the last line of a column is moved the "SAME NAME" switch is checked. If it is off the processing is normal. If it is on there is at least one more number that must be placed in the next column or page. The "CONT" switch is turned on and the "SAME NAME" and "FIRST LINE" switches are turned off. This forces the program to build the name again followed by "--CONT" which will be placed on the first one or two lines of the next column. There is one exception to this which is explained below.

   c. Normal line. It must now be determined which line is to be moved to the column. If position 1-5 of the first line work area is blank the second line is moved to the column. If the first line is not blank and the second line work area is blank the first line is moved to the column. If neither are blank they must both be moved. If "COLUMN ONE" switch was not turned on by this record there is still room for both lines. The first line is moved to the column, the first line is blanked and the column routine entered again. Since the first line will then be blank, the second line will be moved to the column.

d. If "COLUMN ONE" switch was turned on by this record and there are two lines, there is not room to place both lines at the bottom of this column. In this case the last line of the column is left blank and the two lines are moved to the next column or page. However, here is the exception mentioned above. If there are two lines, the "COLUMN ONE" switch was turned on by this record and the "CONT" switch has been turned on. We must turn the "CONT" switch off and the "FIRST LINE" and "SAME NAME" switches back on. Since the two lines will not be at the bottom of the column but at the top of the next column there is no need to force the printing of the name and "--CONT" message.

e. All of the column routines are the same except "COLUMN FIVE". This has several additions.

1. The BLX to the "PUT LINE" routine which overlaps writing the output with processing the last column and reading 20% of the input records.

2. The line blanking instructions with their check of "COLUMN FOUR" switch to include or omit the BLX to put the last column.

2. Most of the "LETTER" routine has been described in 2, D, 2 "Letter Breaks". The "CHECK COL FIVE" part of the "LETTER" routine includes a BLX to the "PUT LINE" routine which works hand in hand with the BLX in the "COLUMN FIVE" routine.

3. "PUT LINE" The "COLUMN FIVE LINE COUNTER" will indicate which line in column five has just been filled. The five columns with 3 blanks between will form a 132 character line. If "COLUMN FIVE" switch is on the page number line will complete the page and the "HEADING" switch is turned on to head the next page.

4. "WINDUP" routine is used to force the last page after the last line has been moved to the proper column.

3. QUALITY CONTROL

A. Hash Accumulations

1. Inputs

a. Author input File 0011090
Field 3 Record Count

b. Correction input File 0011090
Field 3 Record Count

2. Output - line records File 0012141
Field 3 Record Count of lines

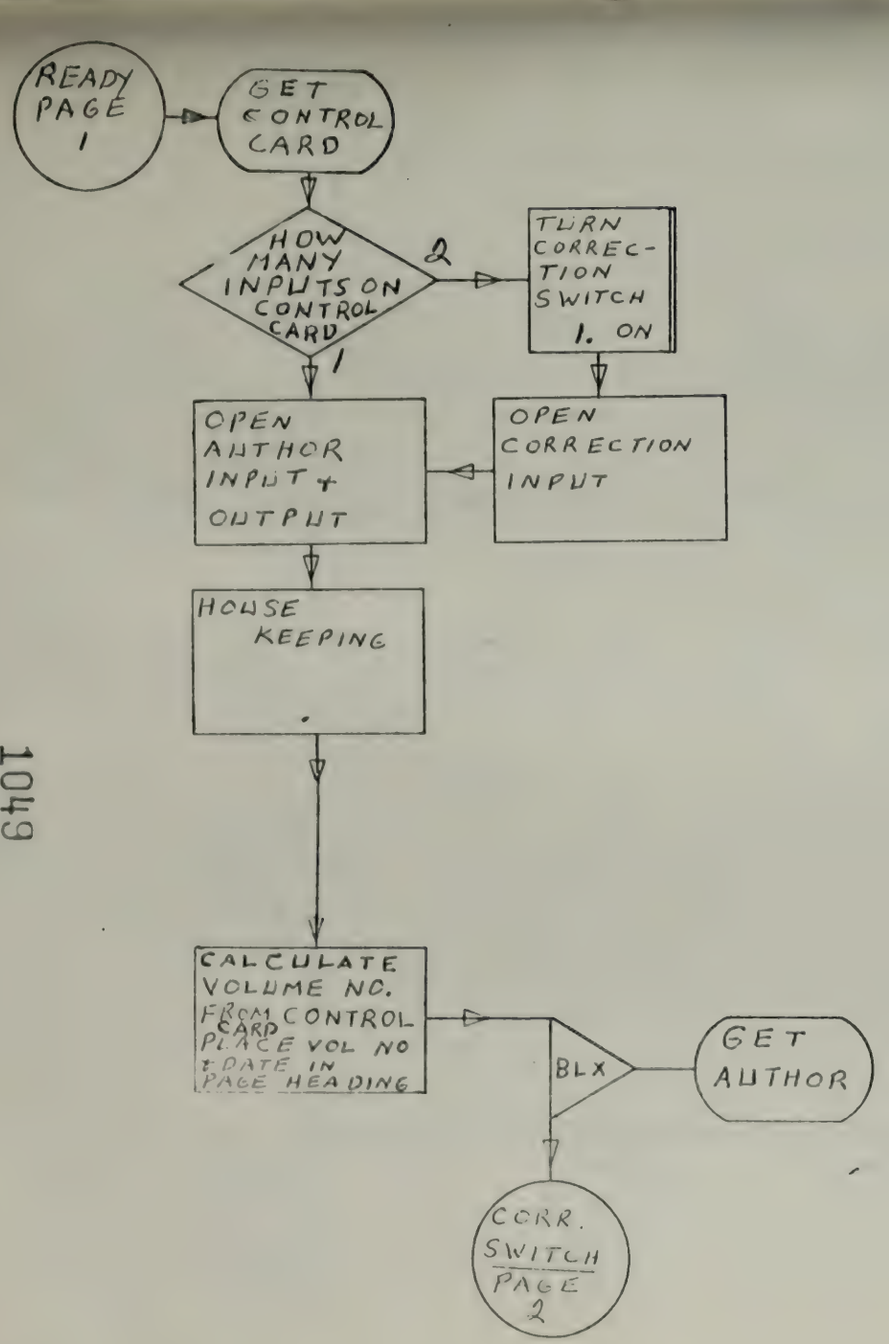
B. End of Job Self Balancing Control

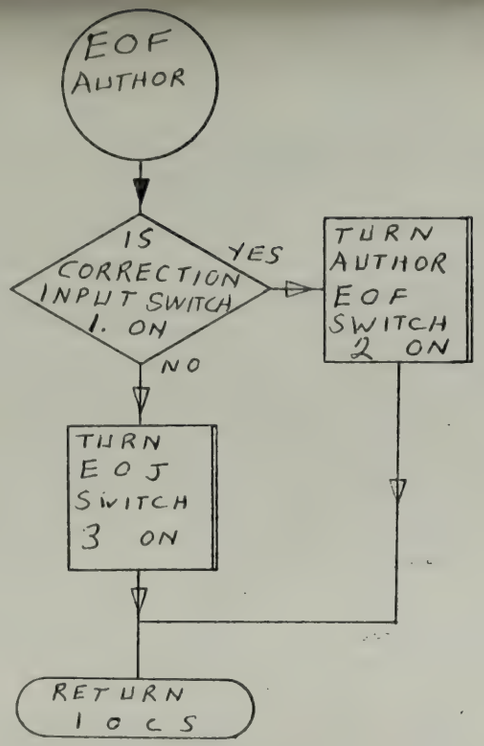
All records should be accounted for:

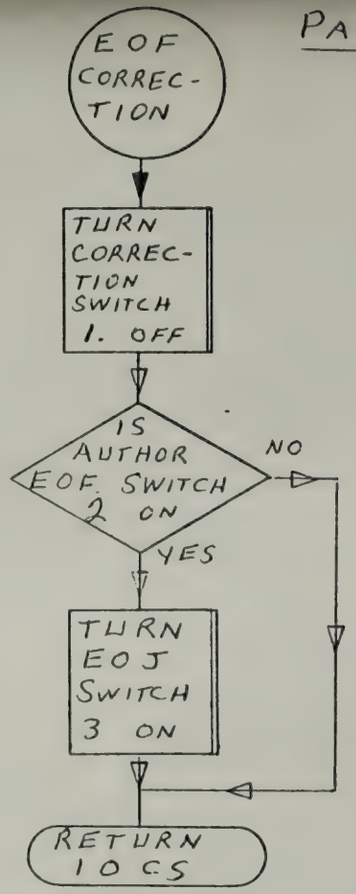
Author Input + Correction Input = Item numbers on output Duplicates dropped + Unmatched Deletions + 2 (Matched Deletions) + Blank records dropped

Accumulate record count according to the formula above. Determine difference (if any) and write as an end-of-job report on the output.

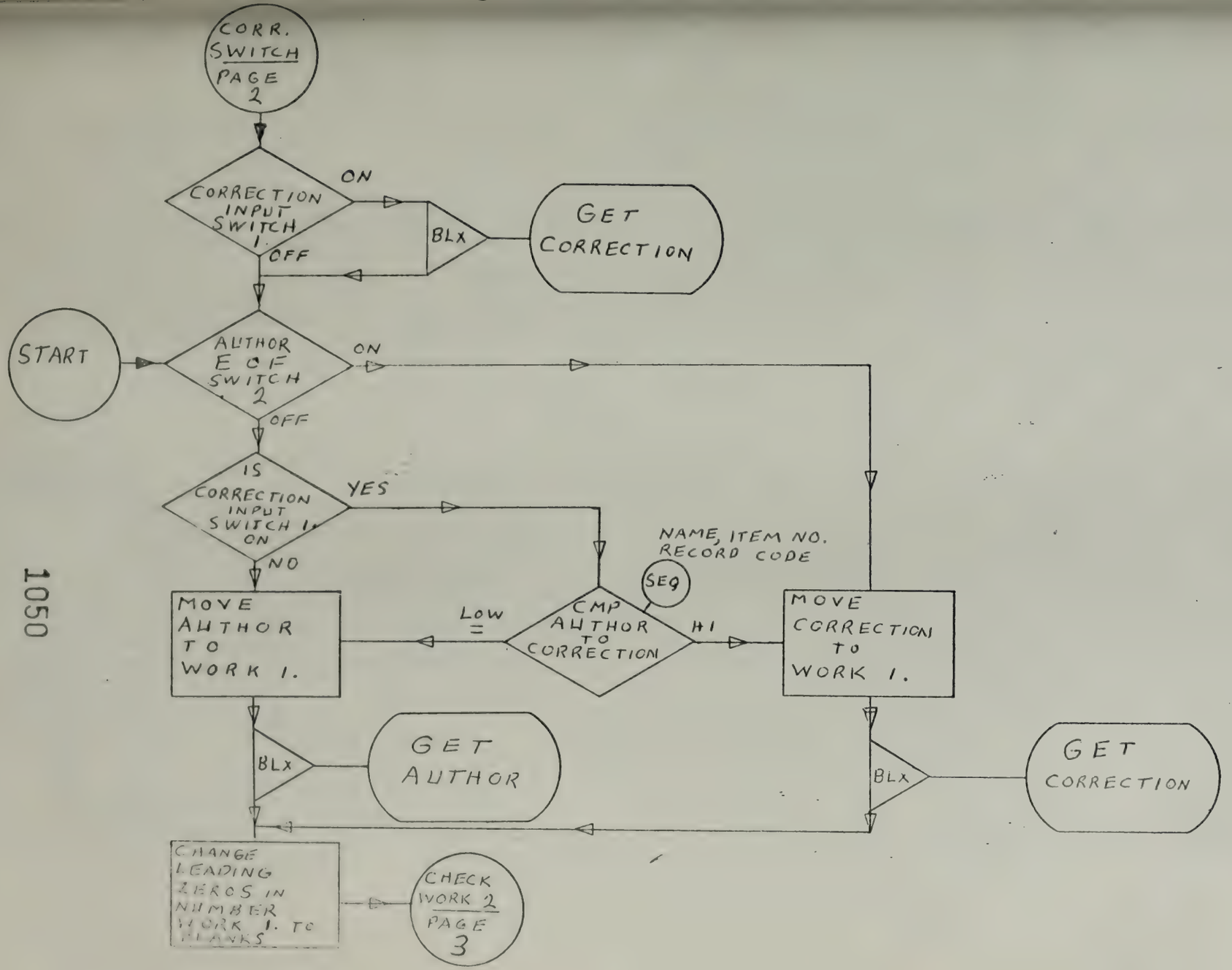
On the typewriter, write a message to indicate balance OK or show difference.


READY PAGE 1
GET CONTROL CARD
HOW MANY INPUTS ON CONTROL CARD
2
1
TURN CORRECTION SWITCH 1. ON
OPEN AUTHOR INPUT + OUTPUT
OPEN CORRECTION INPUT
HOUSE KEEPING
CALCULATE VOLUME NO. FROM CONTROL CARD PLACE VOL NO + DATE IN PAGE HEADING
BLX
GET AUTHOR
CORR. SWITCH PAGE 2

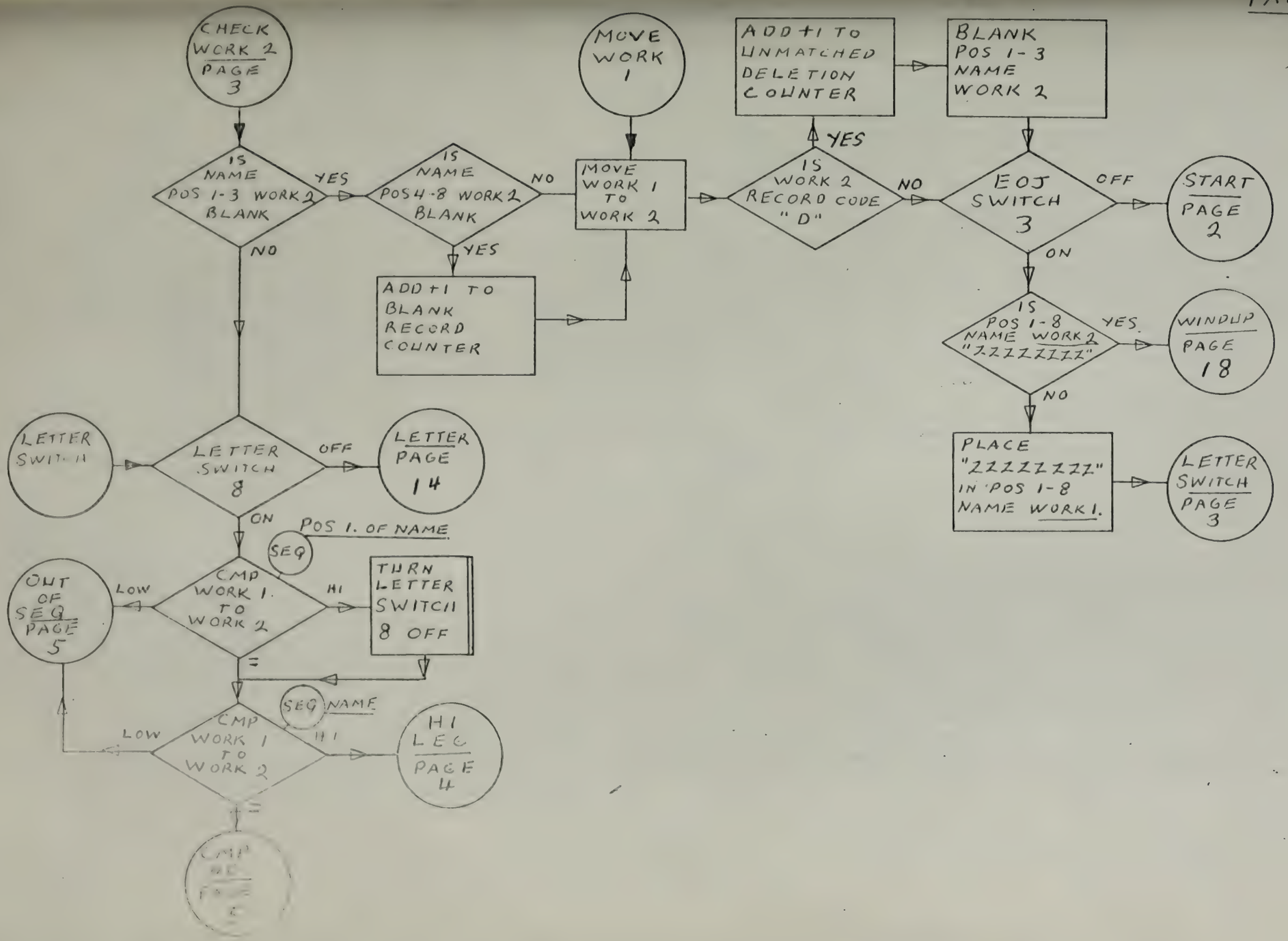

EOF AUTHOR
IS CORRECTION INPUT SWITCH 1. ON
YES
NO
TURN AUTHOR EOF SWITCH 2 ON
TURN EOJ SWITCH 3 ON
RETURN IOCS


EOF CORRECTION
TURN CORRECTION SWITCH 1. OFF
IS AUTHOR EOF SWITCH 2 ON
NO
YES
TURN EOJ SWITCH 3 ON
RETURN IOCS

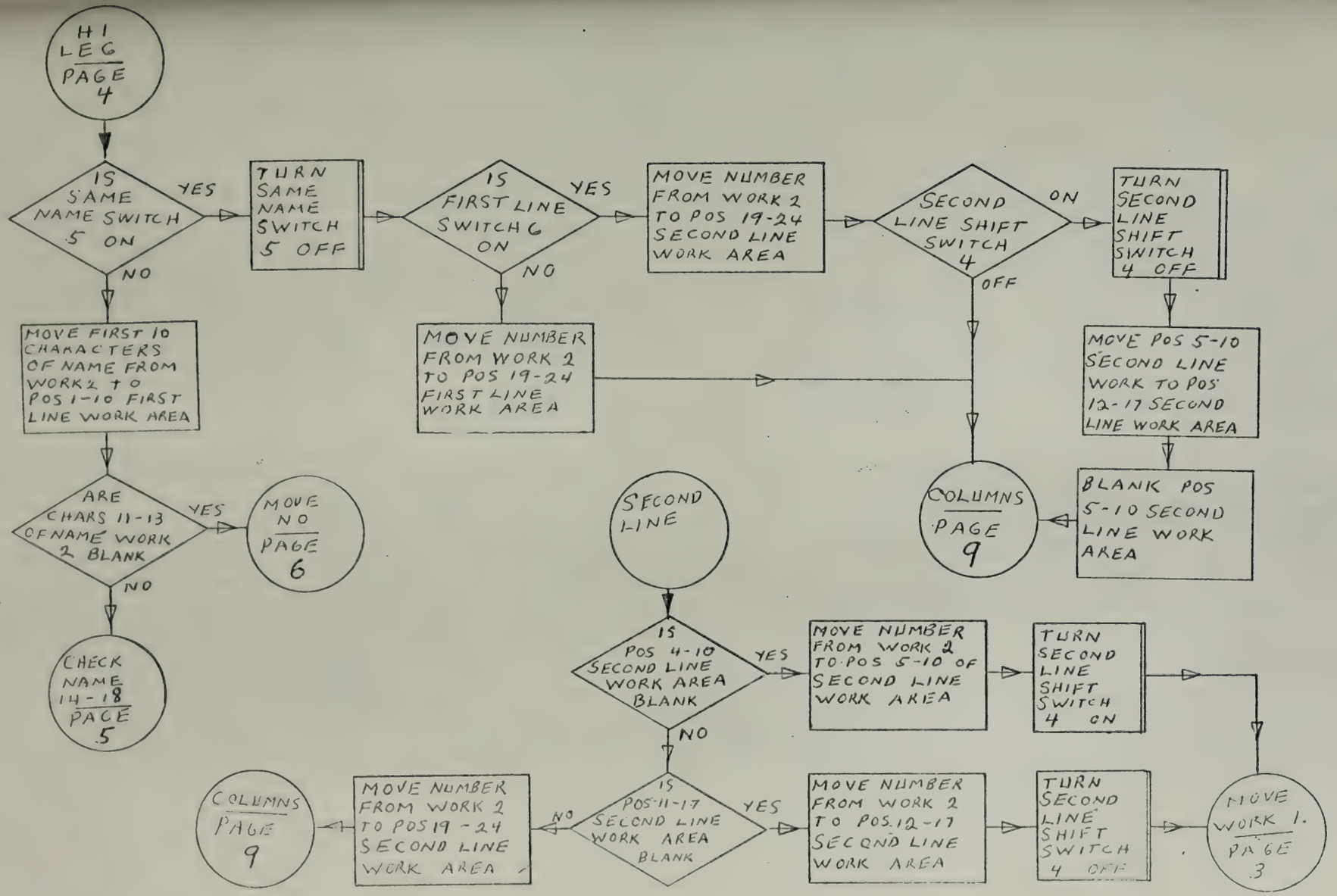
1049

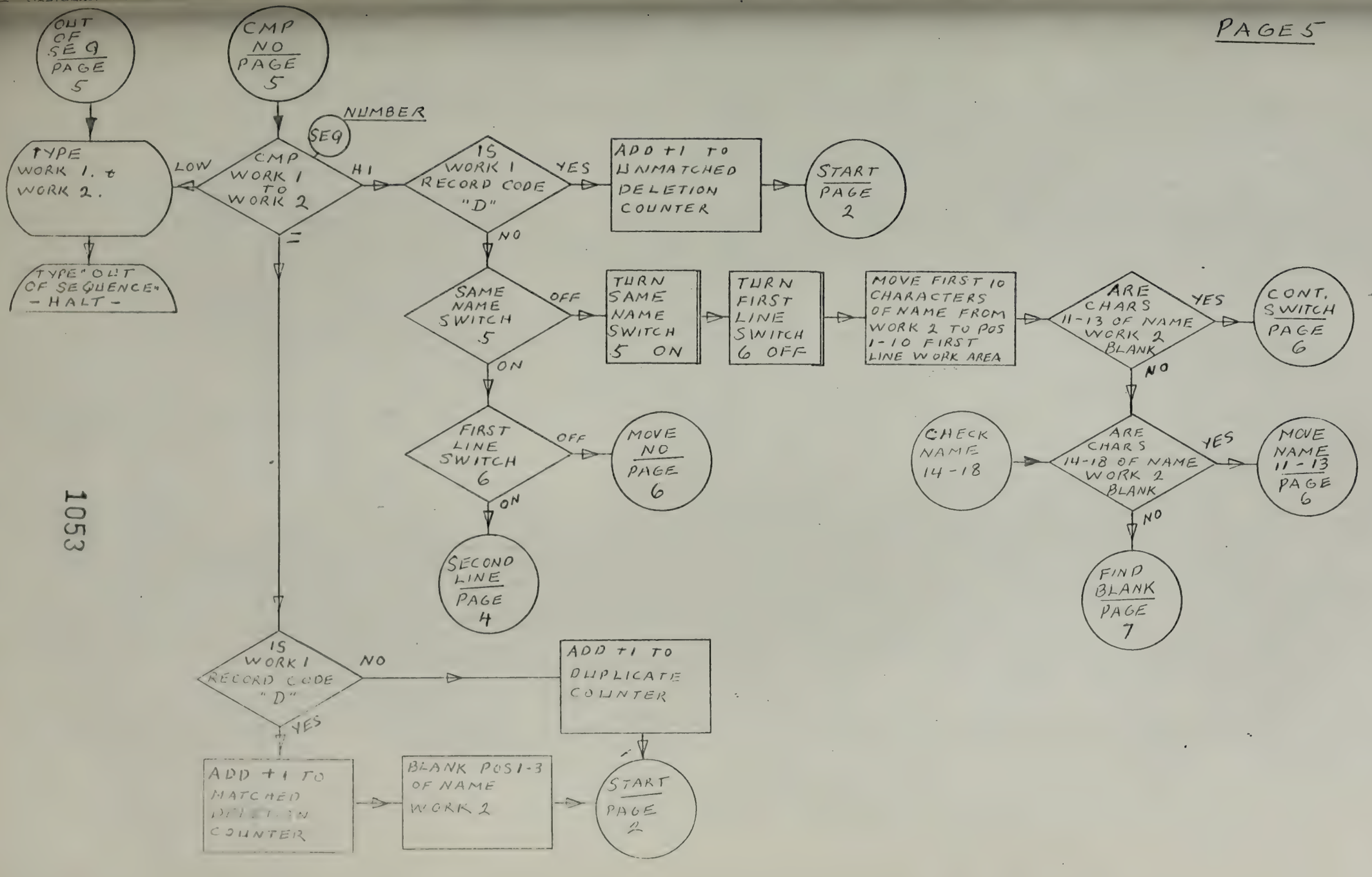

CORR. SWITCH PAGE 2
CORRECTION INPUT SWITCH 1.
ON
OFF
BLX
GET CORRECTION
START
AUTHOR E OF SWITCH 2
ON
OFF
IS CORRECTION INPUT SWITCH 1. ON
YES
NO
NAME, ITEM NO. RECORD CODE
SEQ
CMP AUTHOR TO CORRECTION
LOW =
HI
MOVE AUTHOR TO WORK 1.
MOVE CORRECTION TO WORK 1.
BLX
GET AUTHOR
BLX
GET CORRECTION
CHANGE LEADING ZEROS IN NUMBER WORK 1. TO BLANKS
CHECK WORK 2 PAGE 3

1050

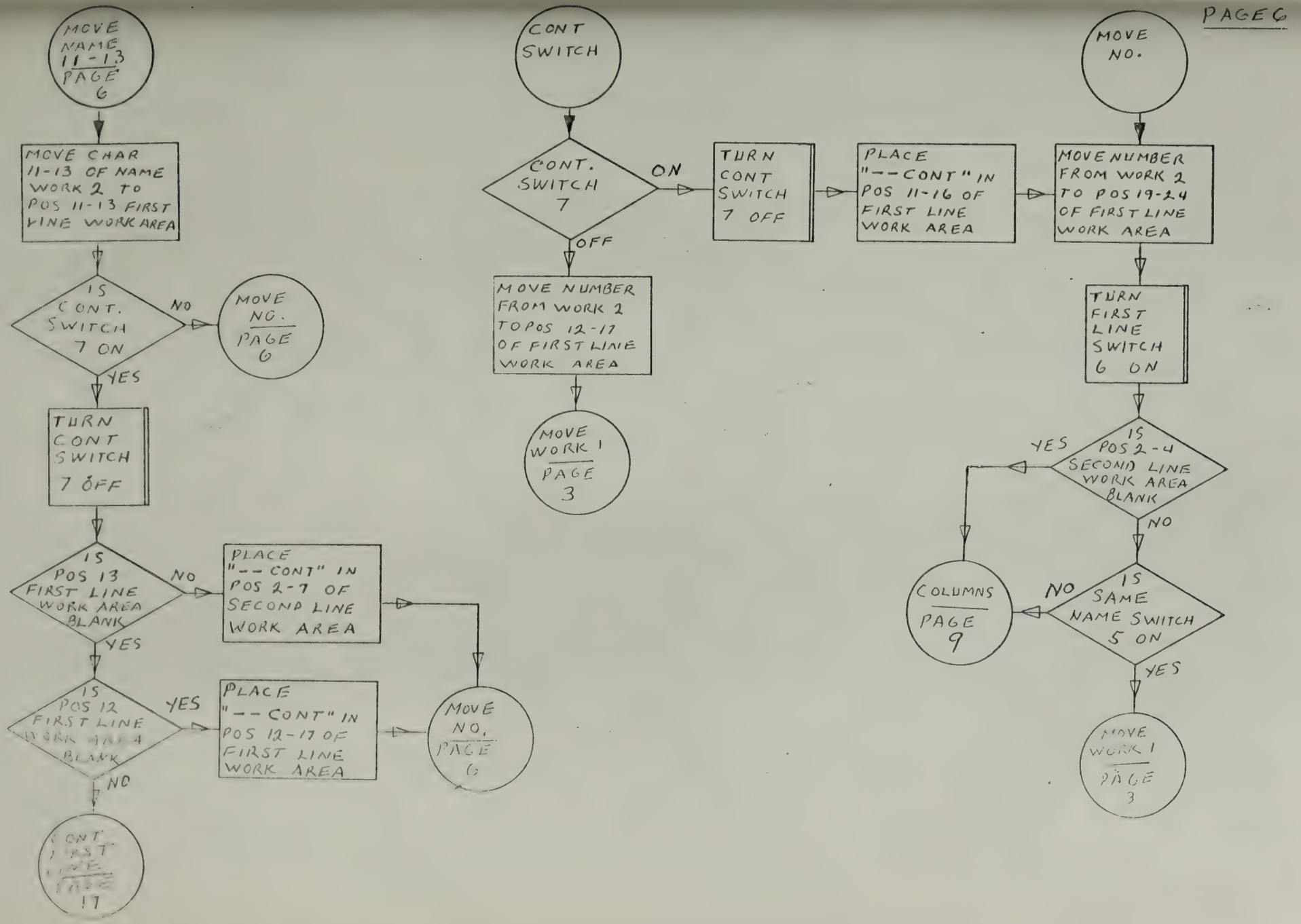

CHECK WORK 2 PAGE 3
IS NAME POS 1-3 WORK 2 BLANK
YES
NO
IS NAME POS 4-8 WORK 2 BLANK
NO
YES
ADD +1 TO BLANK RECORD COUNTER
MOVE WORK 1
MOVE WORK 1 TO WORK 2
ADD +1 TO UNMATCHED DELETION COUNTER
YES
IS WORK 2 RECORD CODE "D"
NO
BLANK POS 1-3 NAME WORK 2
EOJ SWITCH 3
OFF
START PAGE 2
ON
IS POS 1-8 NAME WORK 2 "ZZZZZZZZ"
YES
WINDUP PAGE 18
NO
PLACE "ZZZZZZZZ" IN POS 1-8 NAME WORK 1.
LETTER SWITCH PAGE 3
LETTER SWITCH 8
OFF
LETTER PAGE 14
ON
POS 1. OF NAME
SEQ
CMP WORK 1 TO WORK 2
LOW
OUT OF SEQ PAGE 5
HI
TURN LETTER SWITCH 8 OFF
=
SEQ NAME
CMP WORK 1 TO WORK 2
LOW
HI
HI LEC PAGE 4
=
CMP SEC PAGE 6

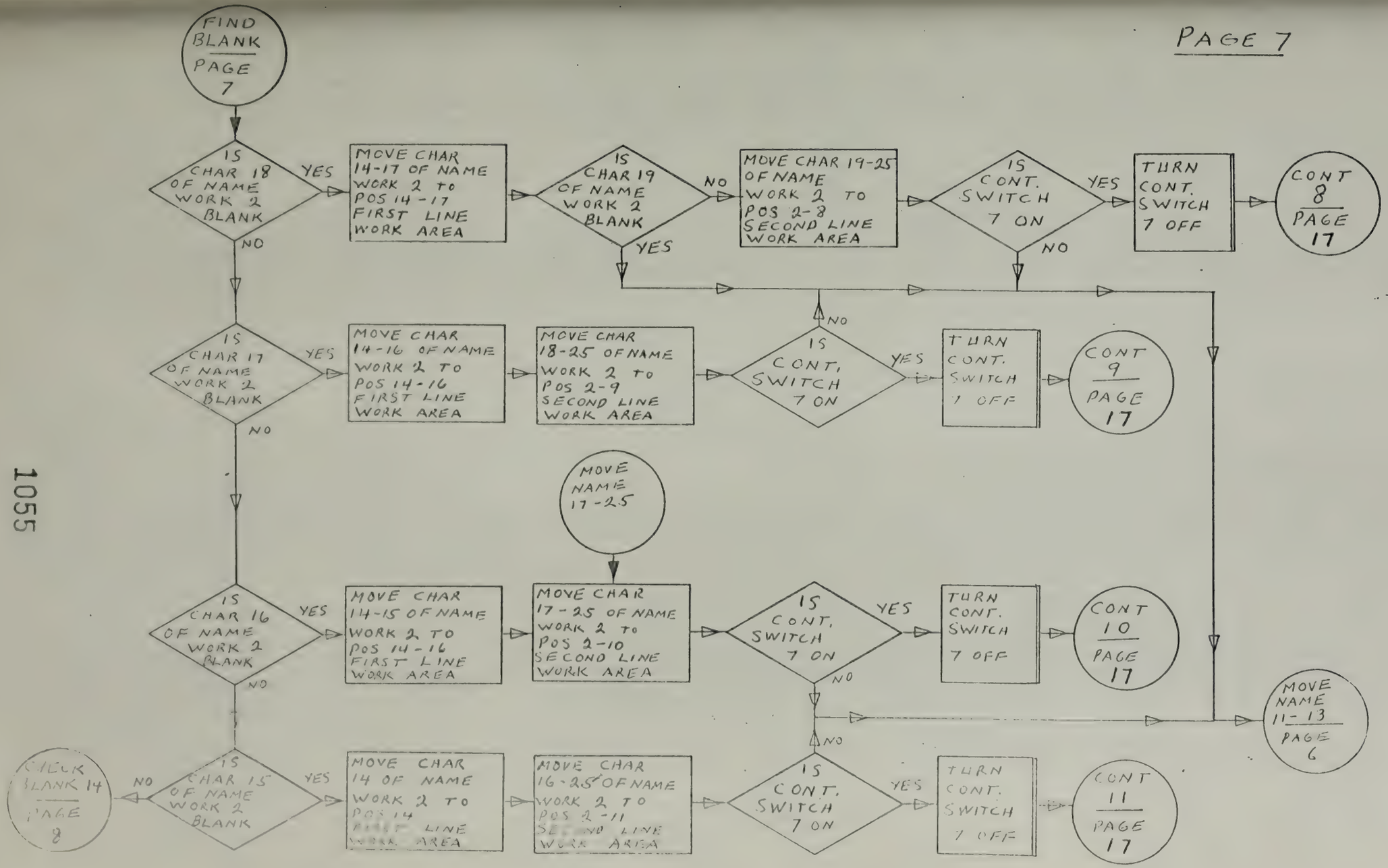
1051


HI LEG PAGE 4
IS SAME NAME SWITCH 5 ON
YES
NO
TURN SAME NAME SWITCH 5 OFF
IS FIRST LINE SWITCH 6 ON
YES
NO
MOVE NUMBER FROM WORK 2 TO POS 19-24 SECOND LINE WORK AREA
SECOND LINE SHIFT SWITCH 4
ON
OFF
TURN SECOND LINE SHIFT SWITCH 4 OFF
MOVE FIRST 10 CHARACTERS OF NAME FROM WORK 2 TO POS 1-10 FIRST LINE WORK AREA
MOVE NUMBER FROM WORK 2 TO POS 19-24 FIRST LINE WORK AREA
MOVE POS 5-10 SECOND LINE WORK TO POS 12-17 SECOND LINE WORK AREA
BLANK POS 5-10 SECOND LINE WORK AREA
COLUMNS PAGE 9
ARE CHARS 11-13 OF NAME WORK 2 BLANK
YES
NO
MOVE NO PAGE 6
CHECK NAME 14-18 PAGE 5
SECOND LINE
IS POS 4-10 SECOND LINE WORK AREA BLANK
YES
NO
MOVE NUMBER FROM WORK 2 TO POS 5-10 OF SECOND LINE WORK AREA
TURN SECOND LINE SHIFT SWITCH 4 ON
IS POS 11-17 SECOND LINE WORK AREA BLANK
NO
YES
MOVE NUMBER FROM WORK 2 TO POS 19-24 SECOND LINE WORK AREA
MOVE NUMBER FROM WORK 2 TO POS 12-17 SECOND LINE WORK AREA
TURN SECOND LINE SHIFT SWITCH 4 OFF
COLUMNS PAGE 9
MOVE WORK 1. PAGE 3

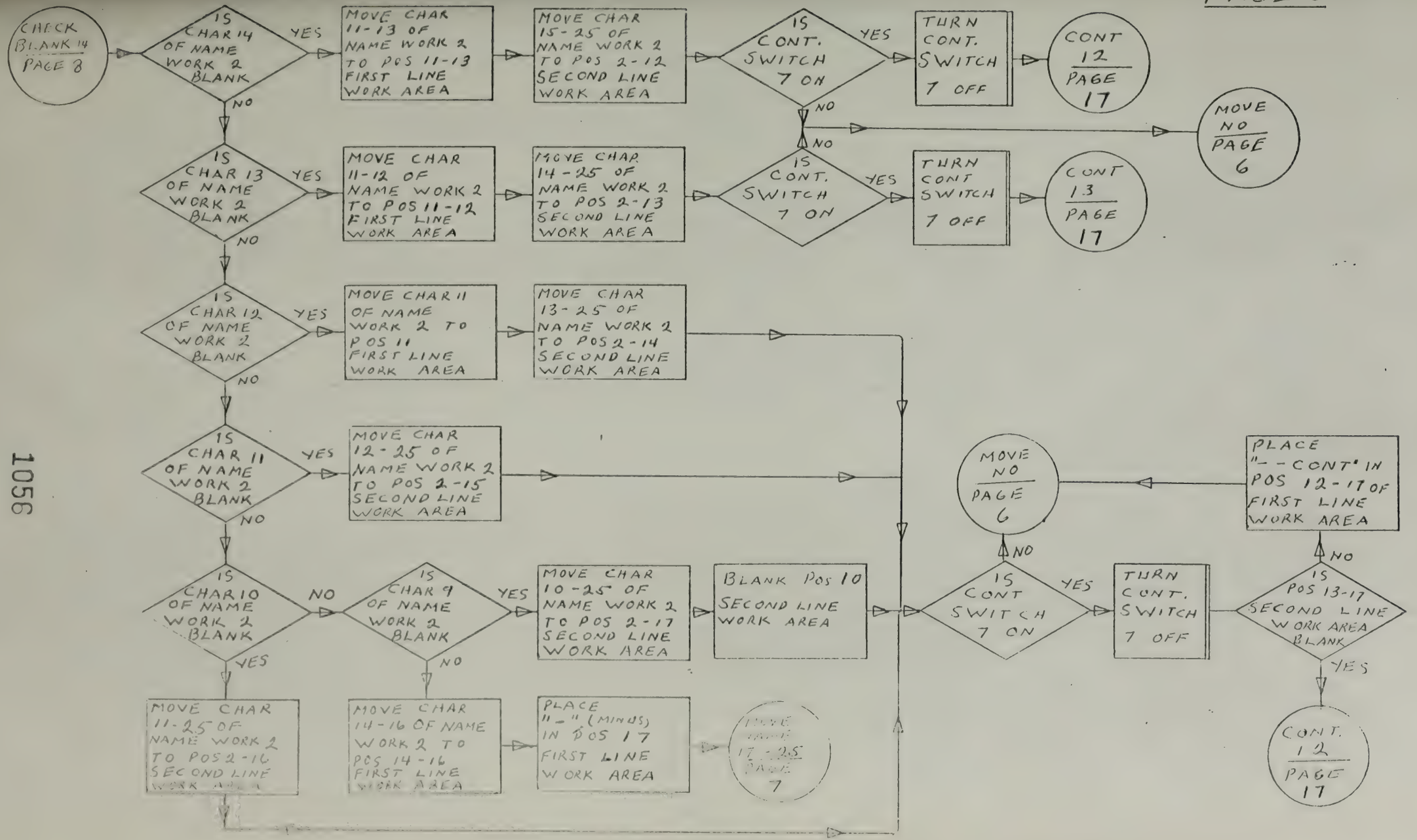

OUT OF SEQ PAGE 5
CMP NO PAGE 5
NUMBER
SEQ
TYPE WORK 1. to WORK 2.
LOW
CMP WORK 1 TO WORK 2
HI
=
IS WORK 1 RECORD CODE "D"
YES
ADD +1 TO UNMATCHED DELETION COUNTER
START PAGE 2
NO
TYPE "OUT OF SEQUENCE" - HALT -
SAME NAME SWITCH 5
OFF
TURN SAME NAME SWITCH 5 ON
TURN FIRST LINE SWITCH 6 OFF
MOVE FIRST 10 CHARACTERS OF NAME FROM WORK 2 TO POS 1-10 FIRST LINE WORK AREA
ARE CHARS 11-13 OF NAME WORK 2 BLANK
YES
CONT. SWITCH PAGE 6
NO
ON
FIRST LINE SWITCH 6
OFF
MOVE NO PAGE 6
ON
SECOND LINE PAGE 4
CHECK NAME 14-18
ARE CHARS 14-18 OF NAME WORK 2 BLANK
YES
MOVE NAME 11-13 PAGE 6
NO
FIND BLANK PAGE 7
IS WORK 1 RECORD CODE "D"
NO
ADD +1 TO DUPLICATE COUNTER
YES
ADD +1 TO MATCHED DELETION COUNTER
BLANK POS 1-3 OF NAME WORK 2
START PAGE 2

1053

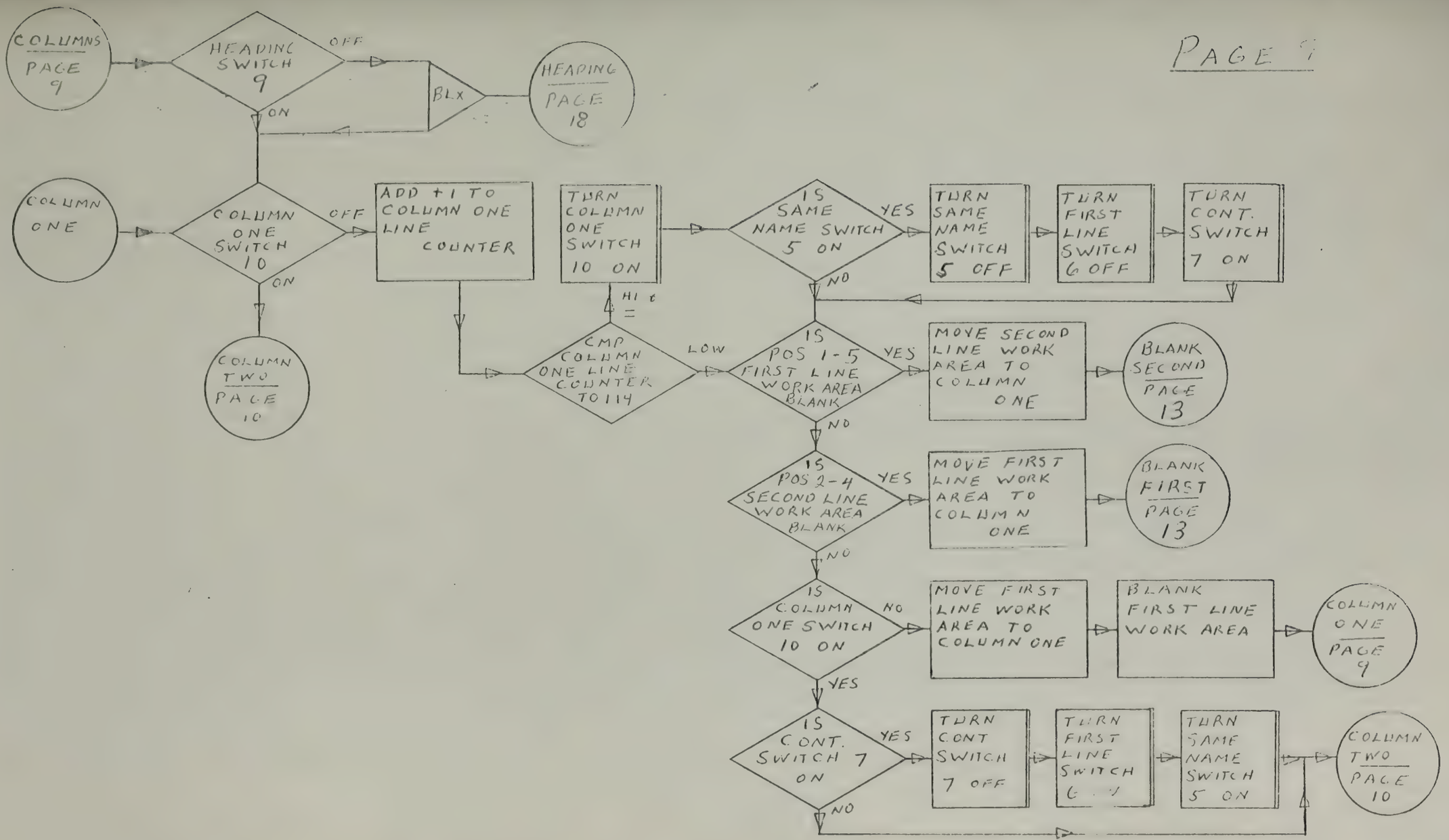

MOVE NAME 11-13 PAGE 6
MOVE CHAR 11-13 OF NAME WORK 2 TO POS 11-13 FIRST LINE WORK AREA
IS CONT. SWITCH 7 ON
NO
MOVE NO. PAGE 6
YES
TURN CONT SWITCH 7 OFF
IS POS 13 FIRST LINE WORK AREA BLANK
NO
PLACE "--CONT" IN POS 2-7 OF SECOND LINE WORK AREA
YES
IS POS 12 FIRST LINE WORK AREA BLANK
YES
PLACE "--CONT" IN POS 12-17 OF FIRST LINE WORK AREA
MOVE NO. PAGE 6
NO
CONT FIRST LINE PAGE 17
CONT SWITCH
CONT. SWITCH 7
ON
TURN CONT SWITCH 7 OFF
PLACE "--CONT" IN POS 11-16 OF FIRST LINE WORK AREA
OFF
MOVE NUMBER FROM WORK 2 TO POS 12-17 OF FIRST LINE WORK AREA
MOVE WORK 1 PAGE 3
MOVE NO.
MOVE NUMBER FROM WORK 2 TO POS 19-24 OF FIRST LINE WORK AREA
TURN FIRST LINE SWITCH 6 ON
IS POS 2-4 SECOND LINE WORK AREA BLANK
YES
NO
COLUMNS PAGE 9
NO
IS SAME NAME SWITCH 5 ON
YES
MOVE WORK 1 PAGE 3

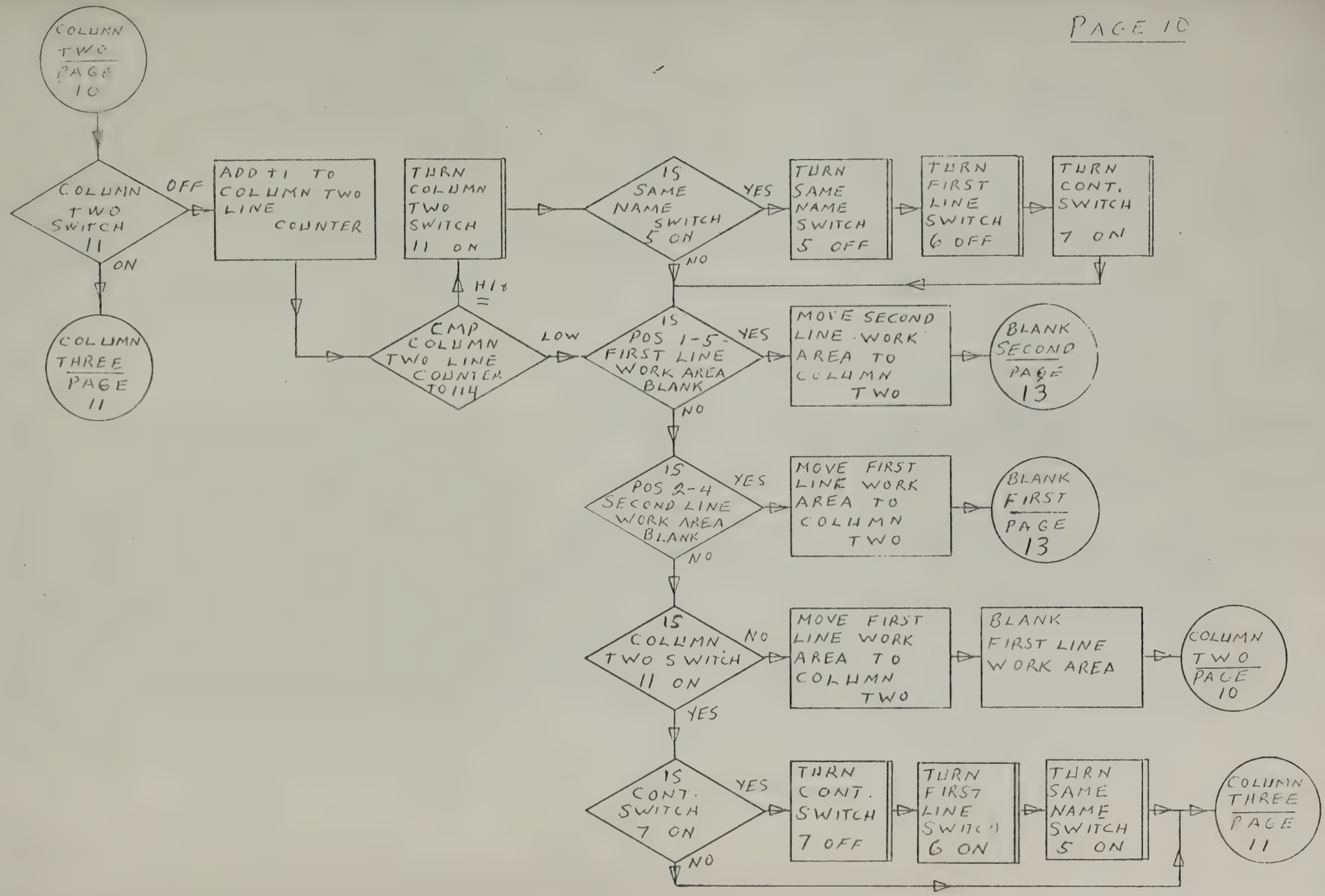

FIND BLANK
PAGE 7
IS CHAR 18 OF NAME WORK 2 BLANK
YES
NO
MOVE CHAR 14-17 OF NAME WORK 2 TO POS 14-17 FIRST LINE WORK AREA
IS CHAR 19 OF NAME WORK 2 BLANK
NO
YES
MOVE CHAR 19-25 OF NAME WORK 2 TO POS 2-8 SECOND LINE WORK AREA
IS CONT. SWITCH 7 ON
YES
NO
TURN CONT. SWITCH 7 OFF
CONT 8 PAGE 17
IS CHAR 17 OF NAME WORK 2 BLANK
YES
NO
MOVE CHAR 14-16 OF NAME WORK 2 TO POS 14-16 FIRST LINE WORK AREA
MOVE CHAR 18-25 OF NAME WORK 2 TO POS 2-9 SECOND LINE WORK AREA
IS CONT. SWITCH 7 ON
NO
YES
TURN CONT. SWITCH 7 OFF
CONT 9 PAGE 17
MOVE NAME 17-25
IS CHAR 16 OF NAME WORK 2 BLANK
YES
NO
MOVE CHAR 14-15 OF NAME WORK 2 TO POS 14-16 FIRST LINE WORK AREA
MOVE CHAR 17-25 OF NAME WORK 2 TO POS 2-10 SECOND LINE WORK AREA
IS CONT. SWITCH 7 ON
YES
NO
TURN CONT. SWITCH 7 OFF
CONT 10 PAGE 17
MOVE NAME 11-13 PAGE 6
CHECK BLANK 14 PAGE 8
NO
IS CHAR 15 OF NAME WORK 2 BLANK
YES
MOVE CHAR 14 OF NAME WORK 2 TO POS 14 FIRST LINE WORK AREA
MOVE CHAR 16-25 OF NAME WORK 2 TO POS 2-11 SECOND LINE WORK AREA
IS CONT. SWITCH 7 ON
YES
NO
TURN CONT. SWITCH 7 OFF
CONT 11 PAGE 17

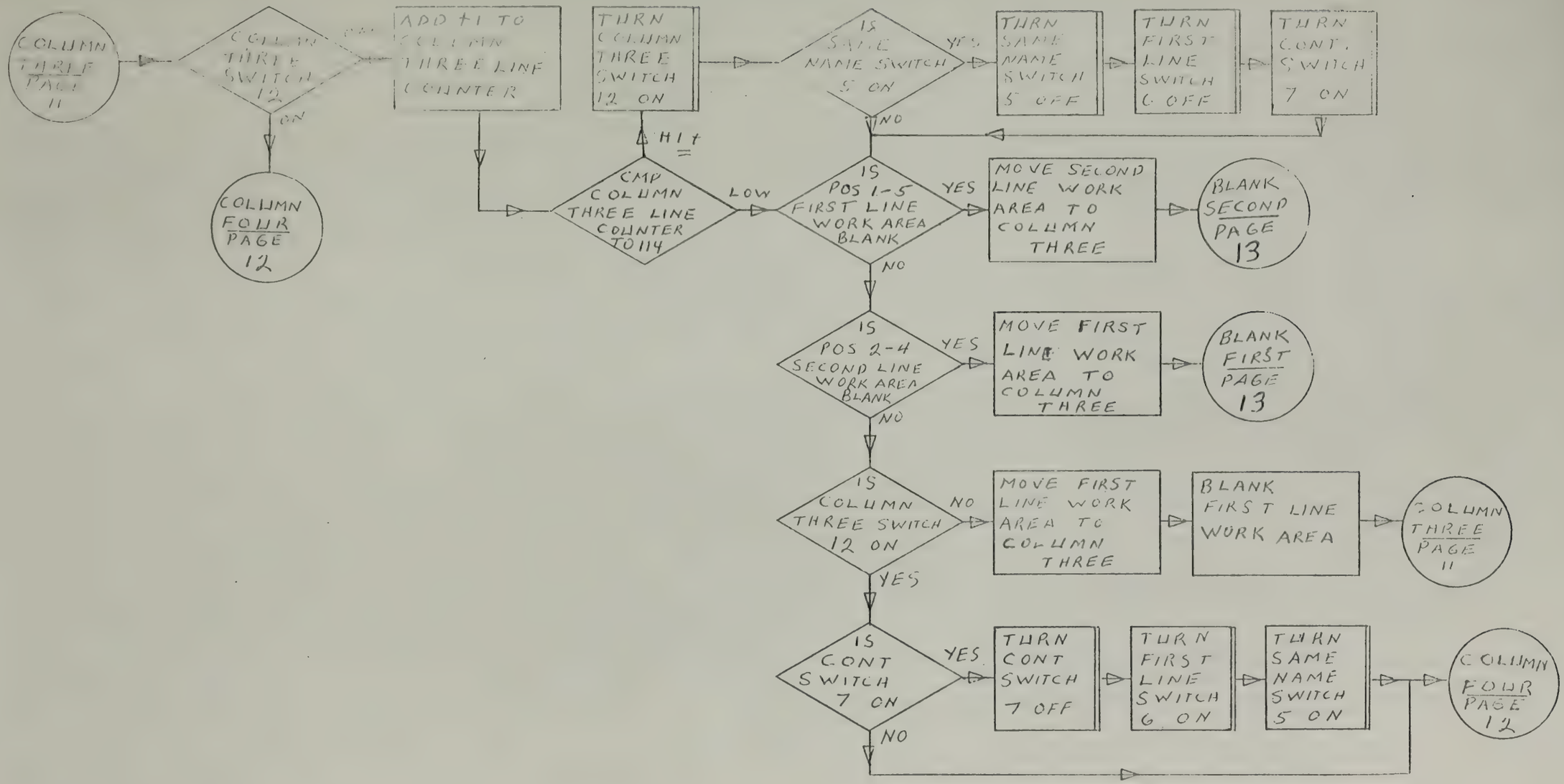
1055

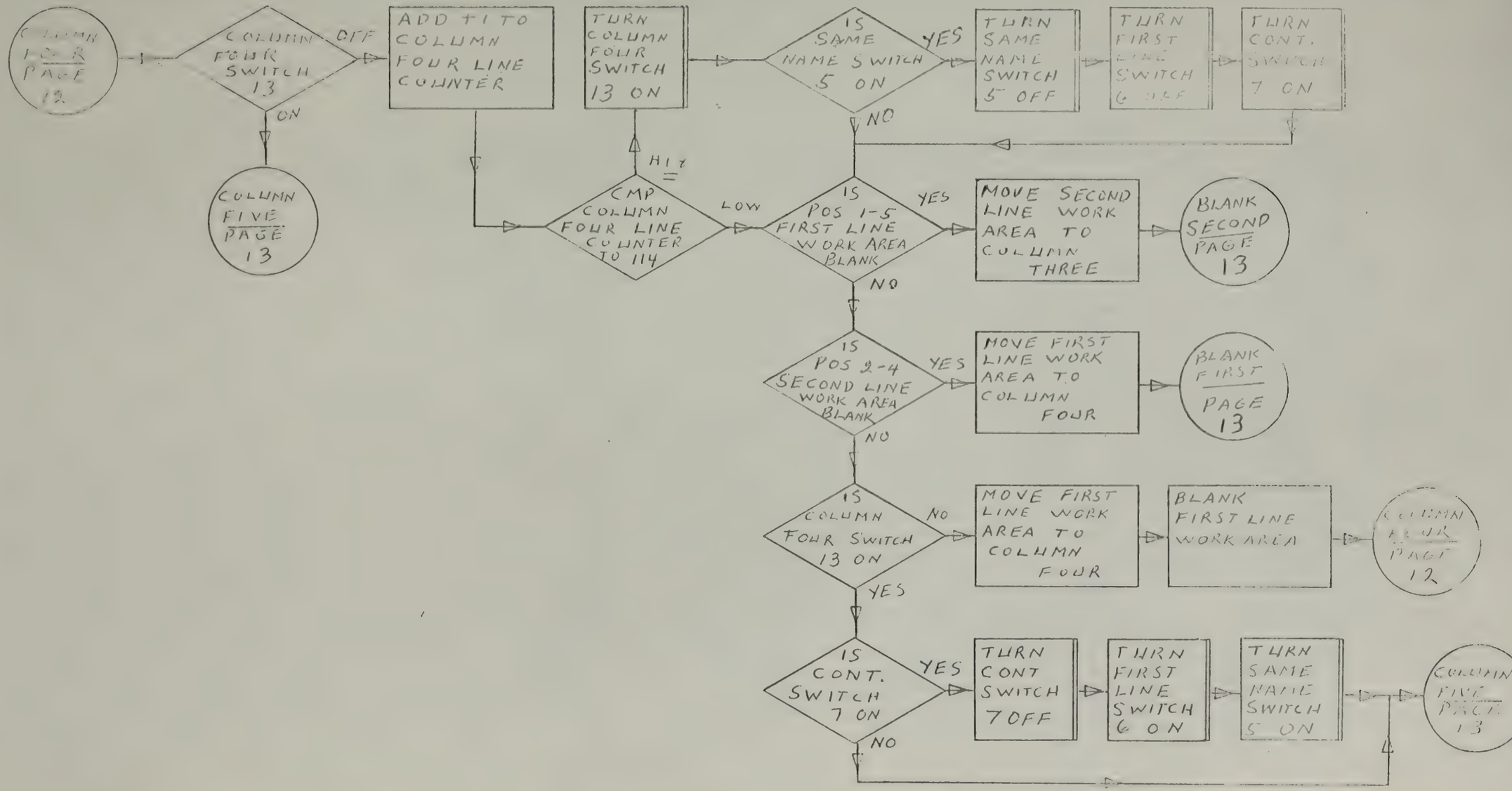

CHECK BLANK 14 PAGE 8
IS CHAR 14 OF NAME WORK 2 BLANK
YES
NO
MOVE CHAR 11-13 OF NAME WORK 2 TO POS 11-13 FIRST LINE WORK AREA
MOVE CHAR 15-25 OF NAME WORK 2 TO POS 2-12 SECOND LINE WORK AREA
IS CONT. SWITCH 7 ON
YES
NO
TURN CONT. SWITCH 7 OFF
CONT 12 PAGE 17
MOVE NO PAGE 6
IS CHAR 13 OF NAME WORK 2 BLANK
YES
NO
MOVE CHAR 11-12 OF NAME WORK 2 TO POS 11-12 FIRST LINE WORK AREA
MOVE CHAR 14-25 OF NAME WORK 2 TO POS 2-13 SECOND LINE WORK AREA
IS CONT. SWITCH 7 ON
YES
NO
TURN CONT SWITCH 7 OFF
CONT 13 PAGE 17
IS CHAR 12 OF NAME WORK 2 BLANK
YES
NO
MOVE CHAR 11 OF NAME WORK 2 TO POS 11 FIRST LINE WORK AREA
MOVE CHAR 13-25 OF NAME WORK 2 TO POS 2-14 SECOND LINE WORK AREA
IS CHAR 11 OF NAME WORK 2 BLANK
YES
NO
MOVE CHAR 12-25 OF NAME WORK 2 TO POS 2-15 SECOND LINE WORK AREA
IS CHAR 10 OF NAME WORK 2 BLANK
NO
YES
IS CHAR 9 OF NAME WORK 2 BLANK
YES
NO
MOVE CHAR 10-25 OF NAME WORK 2 TO POS 2-17 SECOND LINE WORK AREA
BLANK POS 10 SECOND LINE WORK AREA
MOVE CHAR 11-25 OF NAME WORK 2 TO POS 2-16 SECOND LINE WORK AREA
MOVE CHAR 14-16 OF NAME WORK 2 TO POS 14-16 FIRST LINE WORK AREA
PLACE "-" (MINUS) IN POS 17 FIRST LINE WORK AREA
MOVE CHAR 17-25 PAGE 7
IS CONT SWITCH 7 ON
YES
NO
MOVE NO PAGE 6
TURN CONT. SWITCH 7 OFF
PLACE "--CONT" IN POS 12-17 OF FIRST LINE WORK AREA
IS POS 13-17 SECOND LINE WORK AREA BLANK
NO
YES
CONT. 12 PAGE 17

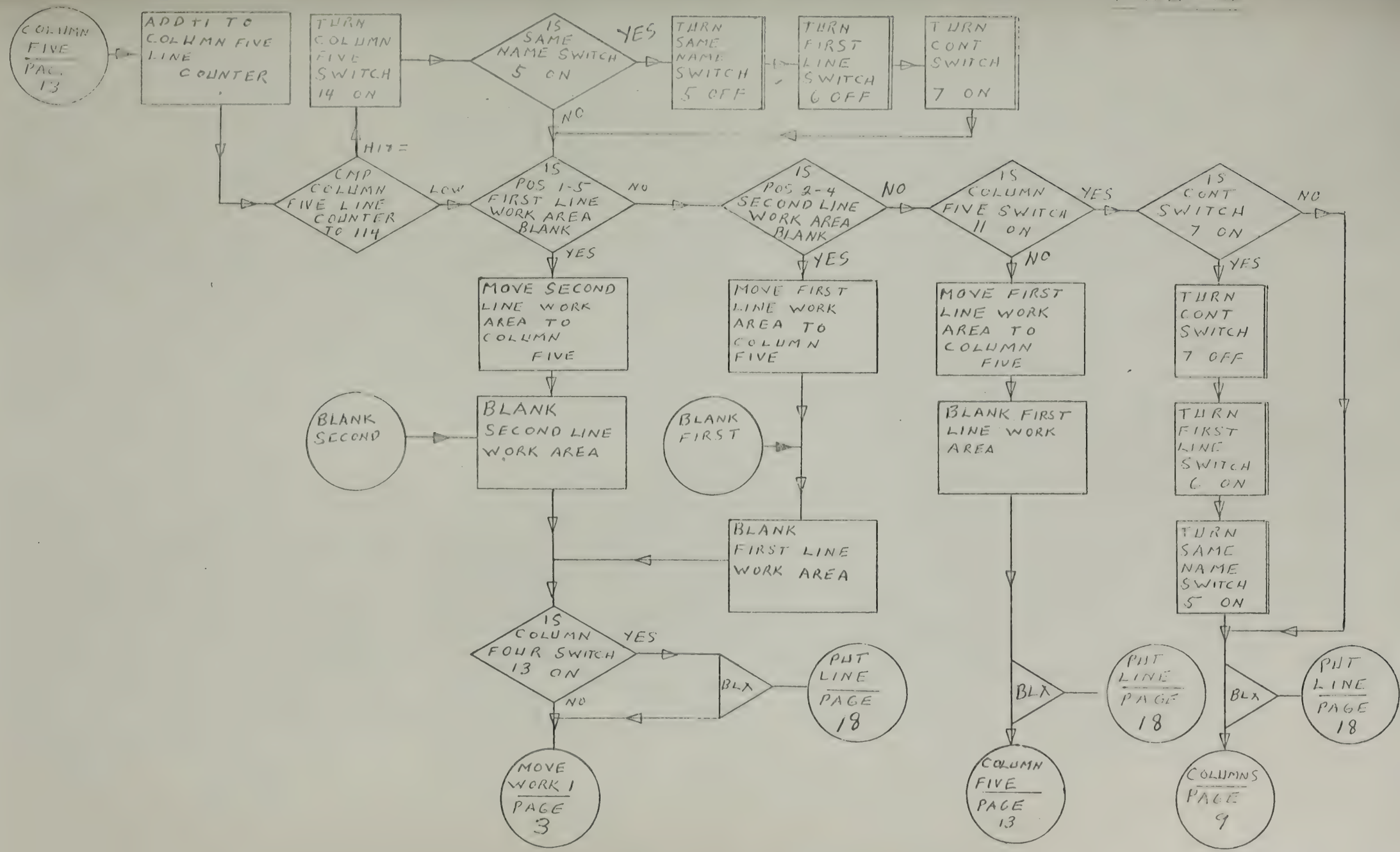
1056

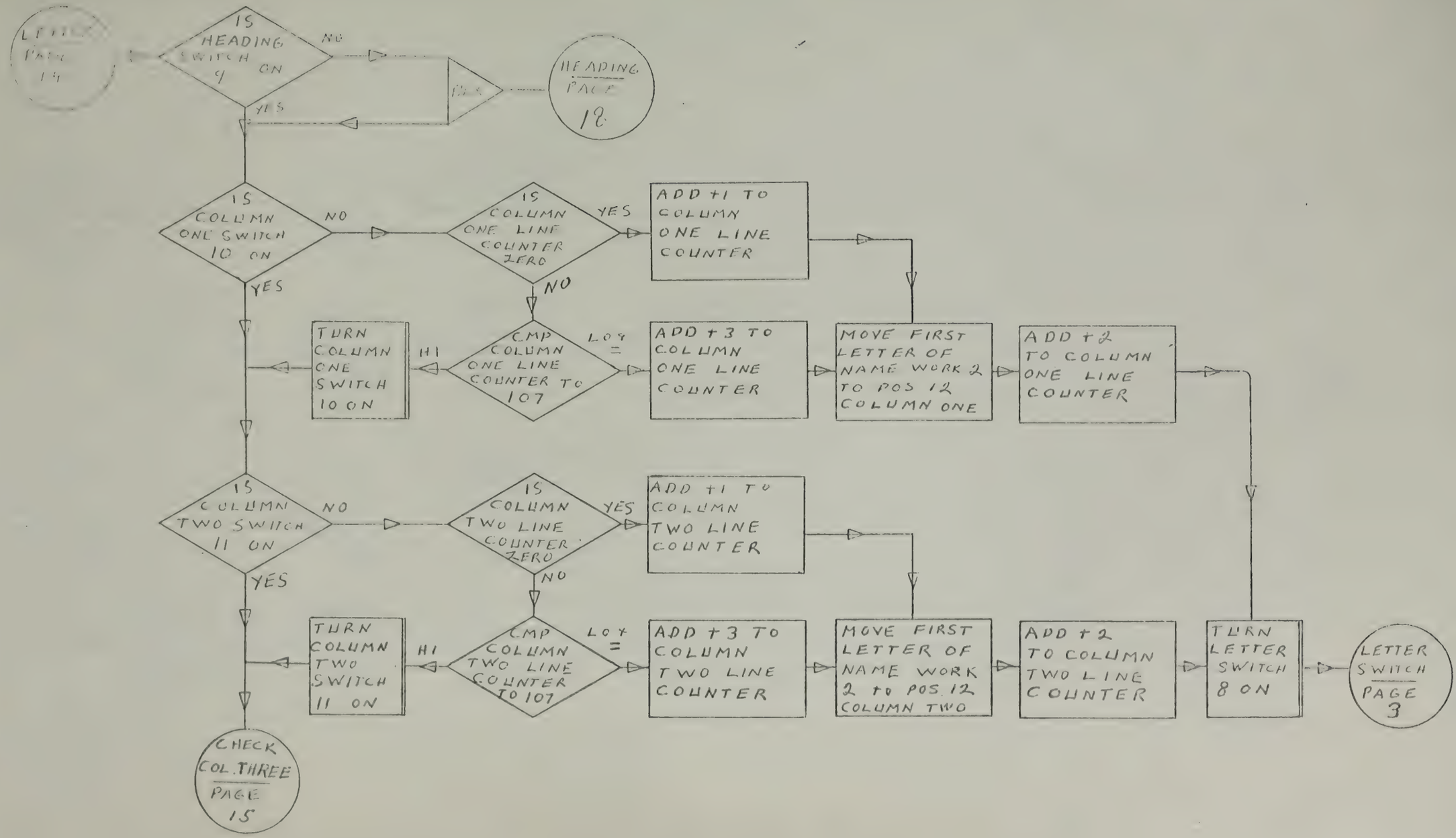

COLUMNS PAGE 9
HEADING SWITCH 9
OFF
ON
BLX
HEADING PAGE 18
COLUMN ONE
COLUMN ONE SWITCH 10
OFF
ON
COLUMN TWO PAGE 10
ADD +1 TO COLUMN ONE LINE COUNTER
TURN COLUMN ONE SWITCH 10 ON
HI t =
CMP COLUMN ONE LINE COUNTER TO 114
LOW
IS SAME NAME SWITCH 5 ON
YES
NO
TURN SAME NAME SWITCH 5 OFF
TURN FIRST LINE SWITCH 6 OFF
TURN CONT. SWITCH 7 ON
IS POS 1-5 FIRST LINE WORK AREA BLANK
YES
NO
MOVE SECOND LINE WORK AREA TO COLUMN ONE
BLANK SECOND PAGE 13
IS POS 2-4 SECOND LINE WORK AREA BLANK
YES
NO
MOVE FIRST LINE WORK AREA TO COLUMN ONE
BLANK FIRST PAGE 13
IS COLUMN ONE SWITCH 10 ON
NO
YES
MOVE FIRST LINE WORK AREA TO COLUMN ONE
BLANK FIRST LINE WORK AREA
COLUMN ONE PAGE 9
IS CONT. SWITCH 7 ON
YES
NO
TURN CONT SWITCH 7 OFF
TURN FIRST LINE SWITCH 6 OFF
TURN SAME NAME SWITCH 5 ON
COLUMN TWO PAGE 10

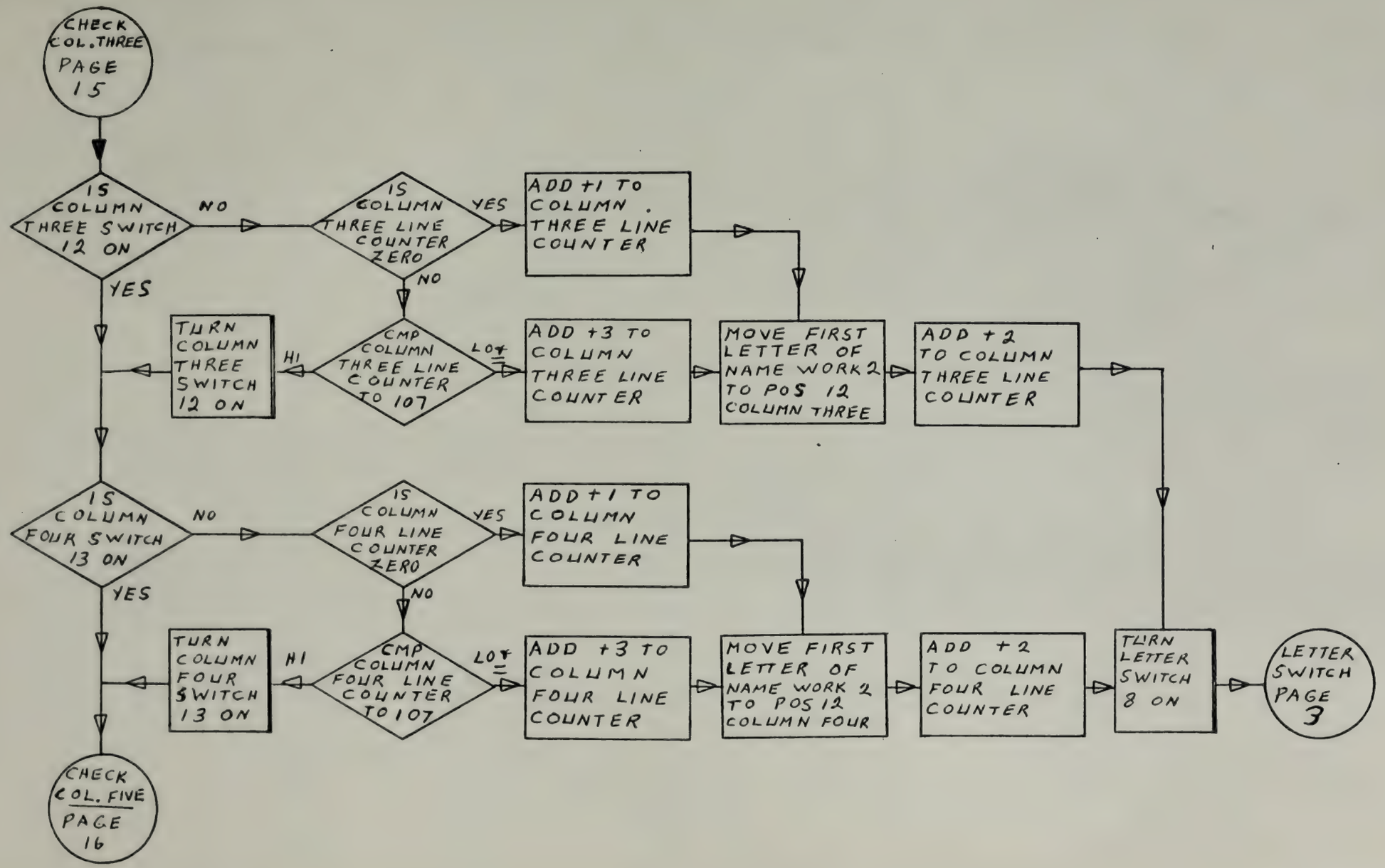

COLUMN TWO PAGE 10
COLUMN TWO SWITCH 11
OFF
ON
ADD 1 TO COLUMN TWO LINE COUNTER
TURN COLUMN TWO SWITCH 11 ON
IS SAME NAME SWITCH 5 ON
YES
NO
TURN SAME NAME SWITCH 5 OFF
TURN FIRST LINE SWITCH 6 OFF
TURN CONT. SWITCH 7 ON
HI =
CMP COLUMN TWO LINE COUNTER TO 114
LOW
IS POS 1-5 FIRST LINE WORK AREA BLANK
YES
NO
MOVE SECOND LINE WORK AREA TO COLUMN TWO
BLANK SECOND PAGE 13
IS POS 2-4 SECOND LINE WORK AREA BLANK
YES
NO
MOVE FIRST LINE WORK AREA TO COLUMN TWO
BLANK FIRST PAGE 13
IS COLUMN TWO SWITCH 11 ON
NO
YES
MOVE FIRST LINE WORK AREA TO COLUMN TWO
BLANK FIRST LINE WORK AREA
COLUMN TWO PAGE 10
IS CONT. SWITCH 7 ON
YES
NO
TURN CONT. SWITCH 7 OFF
TURN FIRST LINE SWITCH 6 ON
TURN SAME NAME SWITCH 5 ON
COLUMN THREE PAGE 11
COLUMN THREE PAGE 11

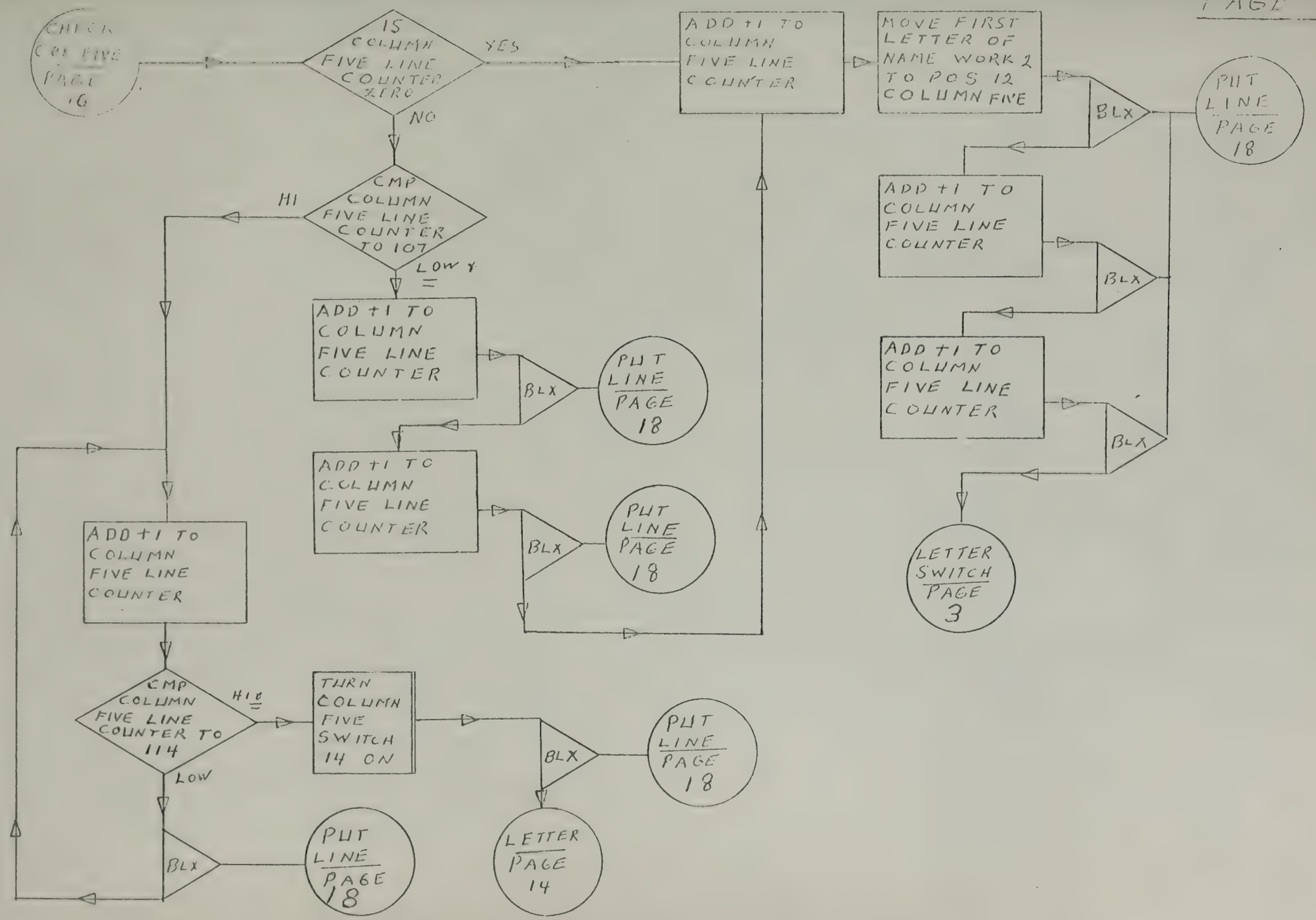

COLUMN THREE PAGE 11
COLUMN THREE SWITCH 12
OFF
ON
ADD +1 TO COLUMN THREE LINE COUNTER
TURN COLUMN THREE SWITCH 12 ON
IS SAME NAME SWITCH 5 ON
YES
TURN SAME NAME SWITCH 5 OFF
TURN FIRST LINE SWITCH 6 OFF
TURN CONT. SWITCH 7 ON
NO
HIT
CMP COLUMN THREE LINE COUNTER TO 114
LOW
COLUMN FOUR PAGE 12
IS POS 1-5 FIRST LINE WORK AREA BLANK
YES
MOVE SECOND LINE WORK AREA TO COLUMN THREE
BLANK SECOND PAGE 13
NO
IS POS 2-4 SECOND LINE WORK AREA BLANK
YES
MOVE FIRST LINE WORK AREA TO COLUMN THREE
BLANK FIRST PAGE 13
NO
IS COLUMN THREE SWITCH 12 ON
NO
MOVE FIRST LINE WORK AREA TO COLUMN THREE
BLANK FIRST LINE WORK AREA
COLUMN THREE PAGE 11
YES
IS CONT SWITCH 7 ON
YES
TURN CONT SWITCH 7 OFF
TURN FIRST LINE SWITCH 6 ON
TURN SAME NAME SWITCH 5 ON
COLUMN FOUR PAGE 12
NO

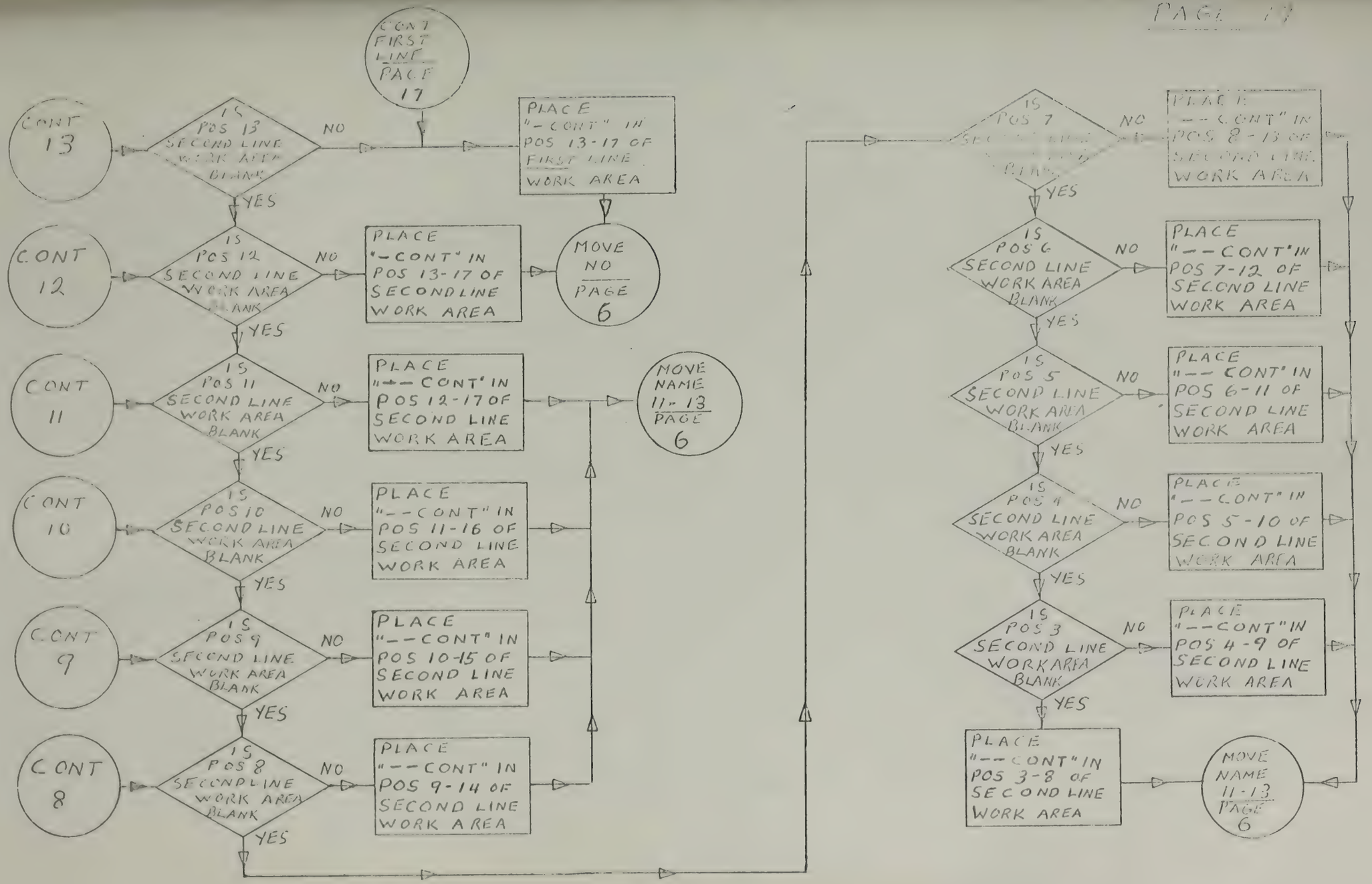

COLUMN FOUR PAGE 12
COLUMN FOUR SWITCH 13
OFF
ON
COLUMN FIVE PAGE 13
ADD 1 TO COLUMN FOUR LINE COUNTER
TURN COLUMN FOUR SWITCH 13 ON
HI =
CMP COLUMN FOUR LINE COUNTER TO 114
LOW
IS SAME NAME SWITCH 5 ON
YES
TURN SAME NAME SWITCH 5 OFF
TURN FIRST LINE SWITCH 6 OFF
TURN CONT. SWITCH 7 ON
NO
IS POS 1-5 FIRST LINE WORK AREA BLANK
YES
MOVE SECOND LINE WORK AREA TO COLUMN THREE
BLANK SECOND PAGE 13
NO
IS POS 2-4 SECOND LINE WORK AREA BLANK
YES
MOVE FIRST LINE WORK AREA TO COLUMN FOUR
BLANK FIRST PAGE 13
NO
IS COLUMN FOUR SWITCH 13 ON
NO
MOVE FIRST LINE WORK AREA TO COLUMN FOUR
BLANK FIRST LINE WORK AREA
COLUMN FOUR PAGE 12
YES
IS CONT. SWITCH 7 ON
YES
TURN CONT SWITCH 7 OFF
TURN FIRST LINE SWITCH 6 ON
TURN SAME NAME SWITCH 5 ON
COLUMN FIVE PAGE 13
NO

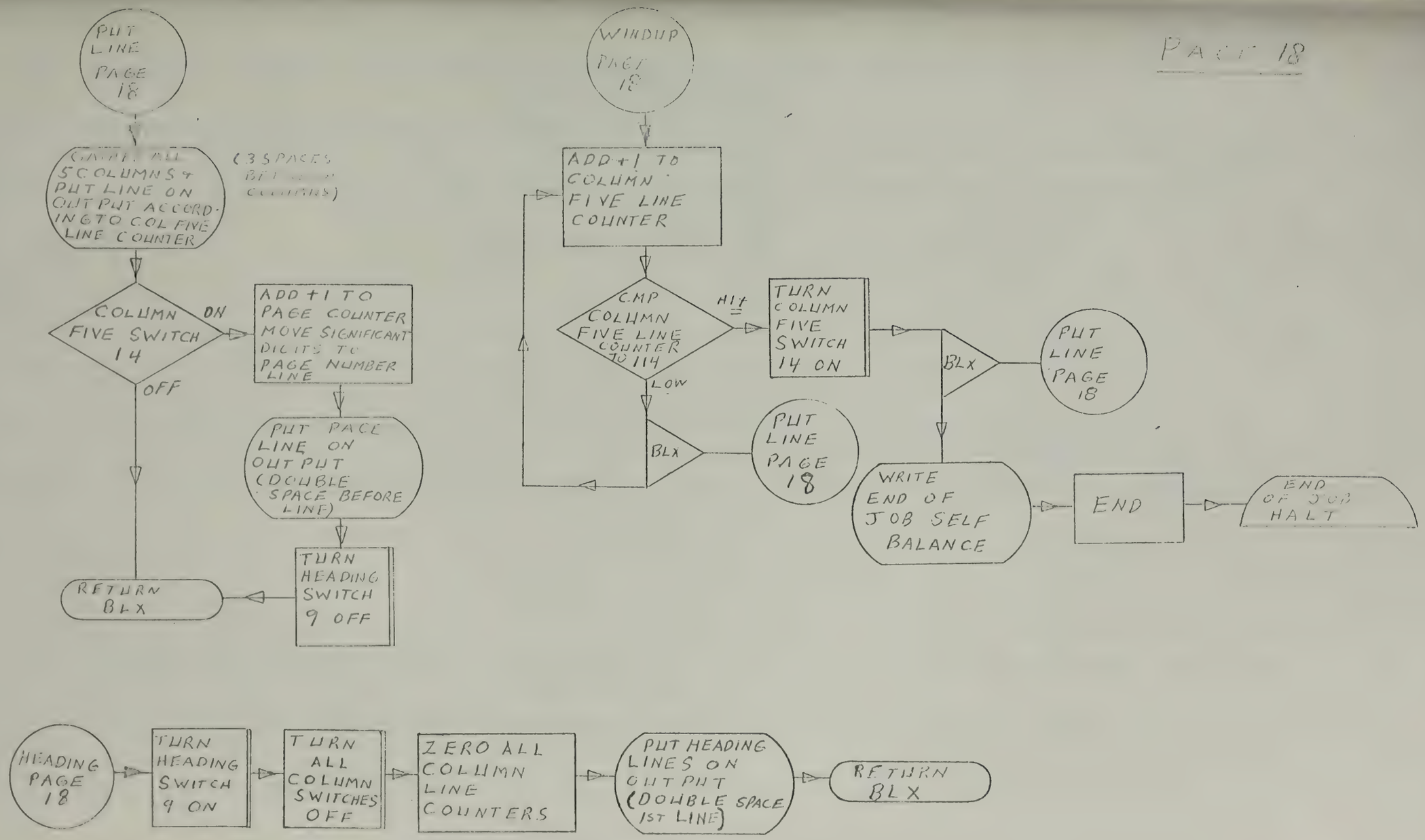

COLUMN FIVE PAG. 13
ADD 1 TO COLUMN FIVE LINE COUNTER
TURN COLUMN FIVE SWITCH 14 ON
IS SAME NAME SWITCH 5 ON
YES
TURN SAME NAME SWITCH 5 OFF
TURN FIRST LINE SWITCH 6 OFF
TURN CONT SWITCH 7 ON
NO
HIGH
CMP COLUMN FIVE LINE COUNTER TO 114
LOW
IS POS 1-5 FIRST LINE WORK AREA BLANK
NO
IS POS 2-4 SECOND LINE WORK AREA BLANK
NO
IS COLUMN FIVE SWITCH 11 ON
YES
IS CONT SWITCH 7 ON
NO
YES
YES
NO
YES
MOVE SECOND LINE WORK AREA TO COLUMN FIVE
MOVE FIRST LINE WORK AREA TO COLUMN FIVE
MOVE FIRST LINE WORK AREA TO COLUMN FIVE
TURN CONT SWITCH 7 OFF
BLANK SECOND
BLANK SECOND LINE WORK AREA
BLANK FIRST
BLANK FIRST LINE WORK AREA
TURN FIRST LINE SWITCH 6 ON
BLANK FIRST LINE WORK AREA
TURN SAME NAME SWITCH 5 ON
IS COLUMN FOUR SWITCH 13 ON
YES
NO
BLX
PUT LINE PAGE 18
BLX
PUT LINE PAGE 18
BLX
PUT LINE PAGE 18
MOVE WORK 1 PAGE 3
COLUMN FIVE PAGE 13
COLUMNS PAGE 9


LETTER PAGE 14
IS HEADING SWITCH 9 ON
NO
YES
HEADING PAGE 18
IS COLUMN ONE SWITCH 10 ON
NO
YES
IS COLUMN ONE LINE COUNTER ZERO
YES
NO
ADD +1 TO COLUMN ONE LINE COUNTER
TURN COLUMN ONE SWITCH 10 ON
HI
CMP COLUMN ONE LINE COUNTER TO 107
LO =
ADD +3 TO COLUMN ONE LINE COUNTER
MOVE FIRST LETTER OF NAME WORK 2 TO POS 12 COLUMN ONE
ADD +2 TO COLUMN ONE LINE COUNTER
IS COLUMN TWO SWITCH 11 ON
NO
YES
IS COLUMN TWO LINE COUNTER ZERO
YES
NO
ADD +1 TO COLUMN TWO LINE COUNTER
TURN COLUMN TWO SWITCH 11 ON
HI
CMP COLUMN TWO LINE COUNTER TO 107
LO =
ADD +3 TO COLUMN TWO LINE COUNTER
MOVE FIRST LETTER OF NAME WORK 2 TO POS 12 COLUMN TWO
ADD +2 TO COLUMN TWO LINE COUNTER
TURN LETTER SWITCH 8 ON
LETTER SWITCH PAGE 3
CHECK COL. THREE PAGE 15


CHECK COL. THREE PAGE 15
IS COLUMN THREE SWITCH 12 ON
NO
YES
IS COLUMN THREE LINE COUNTER ZERO
YES
NO
ADD +1 TO COLUMN THREE LINE COUNTER
TURN COLUMN THREE SWITCH 12 ON
HI
CMP COLUMN THREE LINE COUNTER TO 107
LO =
ADD +3 TO COLUMN THREE LINE COUNTER
MOVE FIRST LETTER OF NAME WORK 2 TO POS 12 COLUMN THREE
ADD +2 TO COLUMN THREE LINE COUNTER
IS COLUMN FOUR SWITCH 13 ON
NO
YES
IS COLUMN FOUR LINE COUNTER ZERO
YES
NO
ADD +1 TO COLUMN FOUR LINE COUNTER
TURN COLUMN FOUR SWITCH 13 ON
HI
CMP COLUMN FOUR LINE COUNTER TO 107
LO =
ADD +3 TO COLUMN FOUR LINE COUNTER
MOVE FIRST LETTER OF NAME WORK 2 TO POS 12 COLUMN FOUR
ADD +2 TO COLUMN FOUR LINE COUNTER
TURN LETTER SWITCH 8 ON
LETTER SWITCH PAGE 3
CHECK COL. FIVE PAGE 16


CHECK COL FIVE PAGE 16
IS COLUMN FIVE LINE COUNTER ZERO
YES
NO
ADD +1 TO COLUMN FIVE LINE COUNTER
MOVE FIRST LETTER OF NAME WORK 2 TO POS 12 COLUMN FIVE
BLX
PUT LINE PAGE 18
ADD +1 TO COLUMN FIVE LINE COUNTER
BLX
ADD +1 TO COLUMN FIVE LINE COUNTER
BLX
LETTER SWITCH PAGE 3
CMP COLUMN FIVE LINE COUNTER TO 107
HI
LOW =
ADD +1 TO COLUMN FIVE LINE COUNTER
BLX
PUT LINE PAGE 18
ADD +1 TO COLUMN FIVE LINE COUNTER
BLX
PUT LINE PAGE 18
ADD +1 TO COLUMN FIVE LINE COUNTER
CMP COLUMN FIVE LINE COUNTER TO 114
HI =
LOW
TURN COLUMN FIVE SWITCH 14 ON
BLX
PUT LINE PAGE 18
BLX
PUT LINE PAGE 18
LETTER PAGE 14


CONT FIRST LINE PAGE 17
CONT 13
IS POS 13 SECOND LINE WORK AREA BLANK
NO
YES
PLACE "-CONT" IN POS 13-17 OF FIRST LINE WORK AREA
CONT 12
IS POS 12 SECOND LINE WORK AREA BLANK
NO
YES
PLACE "-CONT" IN POS 13-17 OF SECOND LINE WORK AREA
MOVE NO PAGE 6
CONT 11
IS POS 11 SECOND LINE WORK AREA BLANK
NO
YES
PLACE "--CONT" IN POS 12-17 OF SECOND LINE WORK AREA
MOVE NAME 11-13 PAGE 6
CONT 10
IS POS 10 SECOND LINE WORK AREA BLANK
NO
YES
PLACE "--CONT" IN POS 11-16 OF SECOND LINE WORK AREA
CONT 9
IS POS 9 SECOND LINE WORK AREA BLANK
NO
YES
PLACE "--CONT" IN POS 10-15 OF SECOND LINE WORK AREA
CONT 8
IS POS 8 SECOND LINE WORK AREA BLANK
NO
YES
PLACE "--CONT" IN POS 9-14 OF SECOND LINE WORK AREA
IS POS 7 SECOND LINE WORK AREA BLANK
NO
YES
PLACE "--CONT" IN POS 8-13 OF SECOND LINE WORK AREA
IS POS 6 SECOND LINE WORK AREA BLANK
NO
YES
PLACE "--CONT" IN POS 7-12 OF SECOND LINE WORK AREA
IS POS 5 SECOND LINE WORK AREA BLANK
NO
YES
PLACE "--CONT" IN POS 6-11 OF SECOND LINE WORK AREA
IS POS 4 SECOND LINE WORK AREA BLANK
NO
YES
PLACE "--CONT" IN POS 5-10 OF SECOND LINE WORK AREA
IS POS 3 SECOND LINE WORK AREA BLANK
NO
YES
PLACE "--CONT" IN POS 4-9 OF SECOND LINE WORK AREA
PLACE "--CONT" IN POS 3-8 OF SECOND LINE WORK AREA
MOVE NAME 11-13 PAGE 6


PUT LINE PAGE 18
CATH ALL 5 COLUMNS & PUT LINE ON OUT PUT ACCORDING TO COL FIVE LINE COUNTER
(3 SPACES BETWEEN COLUMNS)
COLUMN FIVE SWITCH 14
ON
OFF
ADD +1 TO PAGE COUNTER MOVE SIGNIFICANT DIGITS TO PAGE NUMBER LINE
PUT PAGE LINE ON OUT PUT (DOUBLE SPACE BEFORE LINE)
TURN HEADING SWITCH 9 OFF
RETURN BLX
WINDUP PAGE 18
ADD +1 TO COLUMN FIVE LINE COUNTER
CMP COLUMN FIVE LINE COUNTER TO 114
HIT
LOW
TURN COLUMN FIVE SWITCH 14 ON
BLX
PUT LINE PAGE 18
BLX
PUT LINE PAGE 18
WRITE END OF JOB SELF BALANCE
END
END OF JOB HALT
HEADING PAGE 18
TURN HEADING SWITCH 9 ON
TURN ALL COLUMN SWITCHES OFF
ZERO ALL COLUMN LINE COUNTERS
PUT HEADING LINES ON OUT PUT (DOUBLE SPACE 1ST LINE)
RETURN BLX

1066

PROGRAM AUTH 100

File 0009920 Name AUTHOR Input From Op. No. C/T
Output to Op. No. 00100

Word	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Card		1		2		3		4		5		6		7		8
Col.	1 2 3 4 5 6	7	8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2					3 4 5 6 7 8 9 0	1 2 3 4 5 6	7	8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2						3 4 5 6 7 8 9 0	
	ITEM NO.	RECORD CODE	NAME					BLANK	ITEM NO.	RECORD CODE	NAME				BLANK	

File _____ Name _____ Input From Op. No. _____
Output to Op. No. _____

Word	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Card		1		2		3		4		5		6		7		8
Col.	1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0															

File _____ Name _____ Input From Op. No. _____
Output to Op. No. _____

Word	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Card		1		2		3		4		5		6		7		8
Col.	1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0															

PROGRAM AUTH 100 / AUTH 110 / AUTH 120 RECORD AUTHOR

i/p	o/p	File Number	Oper. No.
X		0009920	00100
X	X	0010090	00110
X	X	0011090	00120

TWZ	
TWC	
TWR	

WORD NO.	SIGN	0	1	2	3	4	5	6	7	8	9
1	@				ITEM	NUMBER					
2	@	ITEM NUMBER (cont)			RECORD CODE			NAME	CHAR	1-3	
3	@					NAME	CHAR	4-8			
4	@					NAME	CHAR	9-13			
5	@					NAME	CHAR	14-18			
6	@					NAME	CHAR	19-23			
7	@	NAME	CHAR	24-25			BLANK				
8	@					BLANK					
9											
10											

WORD NO.	SIGN
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	

1068

PRELIMINARY DESCRIPTION OF AUTOMATED SUBJECT INDEXES

An automated Monthly index to the Bibliography of Agriculture can be produced with annual accumulations at about the same cost as the present manual annual index. This index can be introduced with a very short lead time and does not require major retraining of the present indexing staff. A taxonomic and geographic index can also be provided with no added effort or time. Further mechanization may be introduced gradually after this step, until the goal of full automation is attained. No part of this plan requires change-over on broad fronts before operations may begin.

The computer system for the indexing function of the Bibliography will accommodate itself to the present indexing, which uses the prior indexes as an authority. Eventually a formal authority should be established but it is not necessary to delay automating the monthly subject index while an authority is prepared. The single citation entry practice will continue, arranged as now by broad subject classifications. These classifications are each structured by subdivisions to four levels. Distribution of citations into these subordinated categories is what determines the physical arrangement of the publication.

The form of the monthly index will resemble the present annual subject index which consists of conventional indexing terms, e.g. "Forests--Ecology--Study and teaching"; "DDT--Insect resistance--Czechoslovakia". However, these indexing terms and the subordinated parts which comprise them are created by a method wholly unlike the assignment of subject headings from an authority list by a cataloger who works with a traditional system.

The indexer will work on an "indexing continuum", the first segment of which has positions with a fixed relationship to each other, while the second part has free-floating and permutable positions. The indexer can manipulate these latter as necessary to bring out whatever aspects of his subject matter seem desirable, or he can indicate his desire for the computer to permute on an equal basis all

of the terms of the indexing continuum. The continuum may be illustrated thus:

1.2.3/4,5,6 or E,PF/4,5,6

The first three positions (which are referred to as "left of the slash") represent the classifications with fixed subordinations that place a citation in its designated position within the body of the Bibliography of Agriculture. While these are also indexing functions they do not assign any terms which appear as such in the monthly index. These listings appear in the front of the monthly issue and form as now a "Table of Contents". Actually, this table of contents is really a classified index affording an approach for broad subject-scanners. The present coding method may be used which is indicated by letters. If a new entry is wanted it may be inserted by using the numbers to indicate the proper place. A combination of letters and numbers could also be used.

The positions on the indexing continuum to the right of the slash, form the monthly index and its cumulations. While to the user's eye the form of this index is identical with conventional indexing terms, he is really looking at the product of controlled permutations of terms, or pre-coordinated terms. These terms were assigned by the indexer much as uniterms or descriptors are assigned in a true coordinate indexing system. It is the computer which combines the individual terms according to instructions furnished to the program by the indexer. The process may best be followed through illustration. The citation itself is the starting point:

GREENE, J.T., and CARMON, J.L. Variation of tracheid length in clonal lines of short leaf pine ...

The indexer will first determine where the citation belongs left of the clash. This places it properly in the body of the Bibliography, where it falls alphabetically by author in the assigned classification. For the sample citation this is "Forestry--Management and Finance--Regeneration and Breeding. The present coding is:

G - FORESTRY
FMF - FOREST MANAGEMENT AND FINANCE
Regen - Regeneration and Breeding

This can then be coded: G,FMF,REGEN/

If standard codes had not already been established the indexer could make the following notes on his worksheet: 1, Forestry 2, Forest Management and Finance 3, Regeneration and Breeding: He would have coded the portion to the left of the slash 1,2,3/

The actual indexing begins beyond the slash. The system using the coded information to the left of the slash would not be used in the production system until the complete citation is used as input to the computer but is included here as an indication of how the automation of the monthly subject index will fit into the total system.

With the citation given, an indexer has assigned the following terms, under which the citation will be subject indexed:

Pinus echinata--Genetics
Pinus echinata--Wood
Wood--Tracheids

In preparing this for the computer, the indexer would have filled out the worksheet thus: 4, Pinus echinata 5, Genetics 6, Wood 7, Tracheids. This completes the basic statement, e.g. 1,2,3/4,5,6,7. To permute the terms in order to generate the desired terms, the indexer will instruct the program what is to be done with the elements on the indexing continuum. The headings used for the present manual system are made with these instructions: 4-5, 4-6, 6-7. This is not a full use of the computer potential. The new index is proposed with a taxonomic and a geogeaphic index. To indicate these an asterisk (*) is prefixed to the posting position whenever a taxonomic term is assigned there. The "posting position" is the first position, or first number, of any permutation instruction. If the posting position is a geographic name, a pound sign (#) is prefixed. These signs instruct the computer to place such permutations in the appropriate separate table, keeping them out of the subject index alphabet.

An indexer oriented to research requirements or having special subject knowledge can exploit the depth of a citation fully using this program. For example using the same citation as before, the following subject indexing terms can be called for:

Asexual reproduction--Pinus echinata
Clones--Pinus echinata
Wood and Bark--Structure--Pinus echinata
Pinus echinata--Asexual reproduction
Pinus echinata--Tracheids

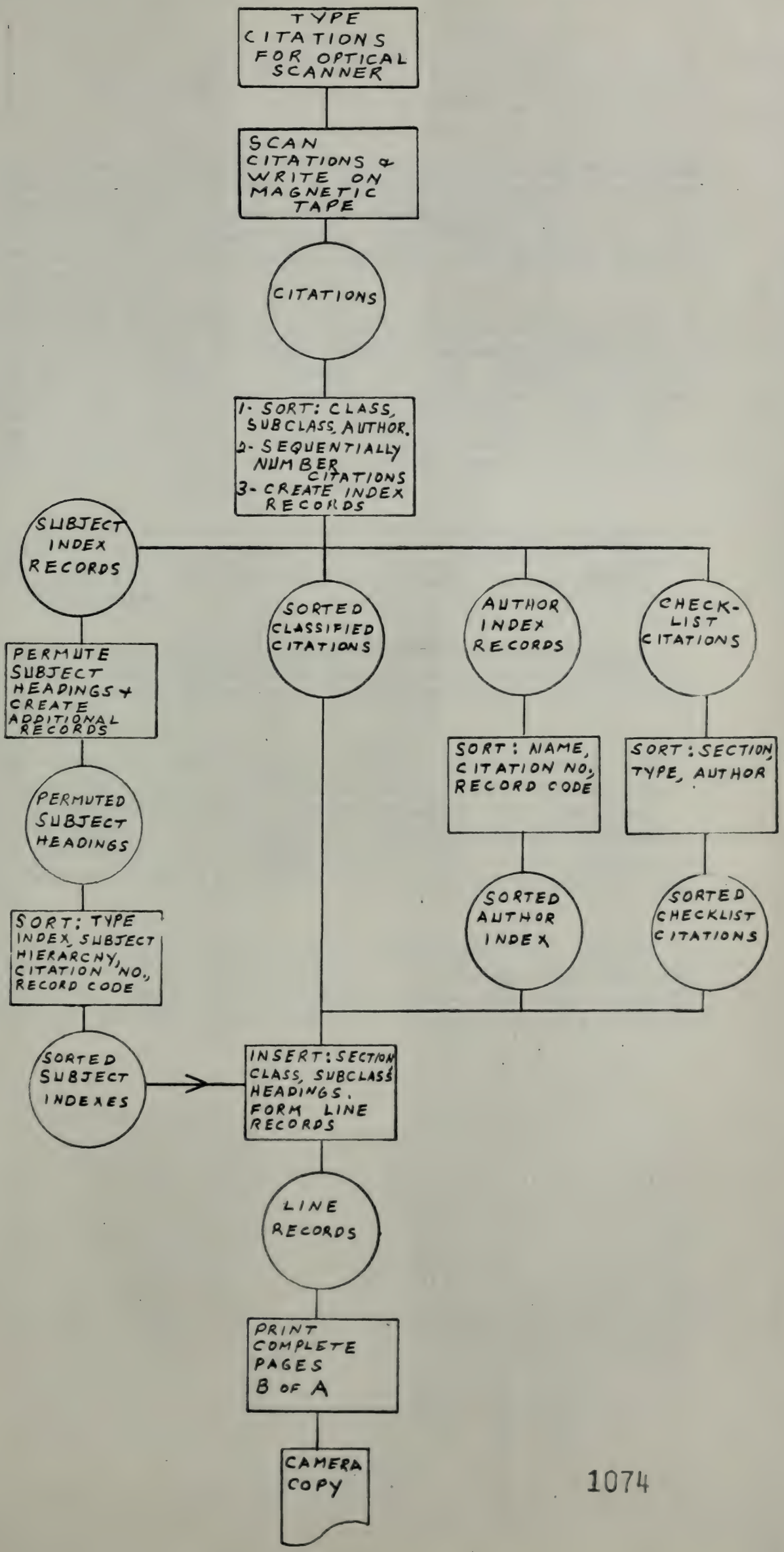
In this instance, the indexing continuum has been expanded to: 1,2,3/4,5,6,7,8,9. Also, the headings with the species name will be transported to the taxonomic index. Assignments are: 4, Asexual reproduction 5, Clones 6, Wood and Bark 7, Structure 8, Tracheids 9, Pinus echinata. The permuting instructions read: 4-9, 5-9, 6-7-9, "9-4, "9-8. Where 9 is in the posting position it has been asterisked, thus generating an entry for the taxonomic index.

This is the essence and substance of the program. Its application is not limited to the subject index. SEE references may be handled in the same manner eliminating the necessity for much computer sorting and merging. For instance, in the above, a reference is required from Short-leaf pine to the Linnean name. This can well be written as 10. Since any given SEE reference is required but once in an issue, duplications can be avoided by the computer program.

Another refinement of the program makes possible the use of what might be called "automatically expandable subject headings"--for want of a good analogy in conventional practice. The monthly indexes will be cumulated annually, or perhaps more often. While the sort for a given monthly index may not place more than three or four citation numbers under a given term, the annual cumulation might build up twenty-five citations at the same point, 4 a 5 year cumulation 125. Accordingly, more specific entry will be desirable. This circumstance might be called for with the more general indexing terms, such as "Forests", "Labor", etc. It should not be employed for specifics, which ought always be given fullest possible entry, even if there is only one citation. In any event, if this device should appear desirable at some point, the convention for it could be: 6-4-$7. This means "print 6-7 and, if the number of citations is greater than x, print 6-4-7". X is an arbitrary cut-in, determined editorially. If the indexer has not provided a term to divide subject headings with more than x, the computer would print out the subject headings and their citation numbers. These could then be expanded to eliminate excessive citation numbers under any one subject heading.

If an authority is developed it would also have predetermined permutation patterns, thus the indexer would have even less coding. Terms which are to be assigned for machine searching but not printed could be processed within this system by merely omiting permutation instructions for those terms. All the terms assigned can be searched in the conventional coordinate method.

BIBLIOGRAPHY OF AGRICULTURE CONDENSED INPUT-OUTPUT FLOW CHART



1074

ACQUISITIONS

The NAL manual system for ordering and other acquisition work makes efficient use of the photoclerk. By photographically copying the bibliographic information, not only is much transcribing avoided, but potential errors are greatly reduced. Once the item is received, however, an official record must be made and often this is largely identical with the ordering record.

Furthermore, the manual system requires filing the order information in a number of places: Numerical order file, alphabetic order file, obligation copy to Budget and Finance, and so on. Stripping these files when the order is received or cancelled is also a chore. Checking for status of order cannot be done regularly and follow-ups are done only on request. In Budget and Finance, obligations must be posted and manually balanced. Similarly, payments made must be posted and the items pulled from the obligations sheet.

Much of this bookkeeping can be done automatically by the computer if the order is machine processed. In addition, the checking for items on order and the preparation of the necessary visible records can all be machine generated.

The following is not meant to be a specific system for processing acquisitions, but is rather a suggested approach. A detailed study of NAL needs would be necessary for the specific design of an acquisition system.

Present selection methods would be continued using the photoclerk to make the initial record. After search and verification that the item is to be acquired and after the vendor or source has been recorded and price indicated, the information is given to an acquisitions clerk. The order is prepared on a document writer which simultaneously types the order, prepares a 3 x 5 carbon copy and punches the computer input cards.

The carbon copy goes into the catalog as an on-order item. This is pulled when the catalog cards are filed. The checklist of punched cards representing the order has a duplicate first card. This duplicated first card carries the order number and about 50 characters of the main entry

and title. This duplicate card is kept in an alphabetic file to be used to identify items received without an order number.

The rest of the punched cards are fed into the computer which adds each record in numeric sequence to the order tape, posts the obligation to the obligation tape, and posts the order summary to the appropriate vendor. If it is to be an acquisition by exchange or gift, the records instead of being posted to the obligations and vendor tapes, will be posted to the appropriate gifts and exchanges tapes. A serial order will also be posted in the serials records but will be marked as an "on order" item.

After posting, the punched cards will be dropped into a tub file in numeric sequence. If the item ordered is a serial, the cards will go into the serial tub file.

A variation of this ordering system is shown on the second ordering chart. In the second proposed system, the temporary catalog card and the actual order to the vendor are produced from the computer. This reduces the typing requirements since the vendor information is pulled from the vendor tape. The only keypunching required is the bibliographic information and the vendor code.

When an item is received, the alphabetic duplicate card and the numeric cards are pulled. The numeric cards accompany the item through processing. The alphabetic duplicate card has punched into it a received signal as well as the essential invoice information (price, date, shipping charges). The duplicate card is fed into the computer and then is sent on with the invoice to Budget and Finance after the received item has been accepted. In the computer, the item is pulled from the order tape and written onto the in-process tape. When Budget and Finance is ready to pay the invoice, a payment card is punched and it and the duplicate card are fed into the computer. The obligation record is reduced, the received item is pulled from the vendor tape and posted to a payment record. A notification is printed or punched out to Treasury to write the necessary check. (The specific record requirements are, no doubt, set forth by GAO in order to preserve an audit trail. These, of course, will be incorporated in the system. These records can be all computer generated.)

If an exchange item is received, the card pulling remains the same but instead of changing the obligation and vendor tapes, it is the

exchange and gift tape that is updated in that the "on-order" portion of the record is changed to "received."

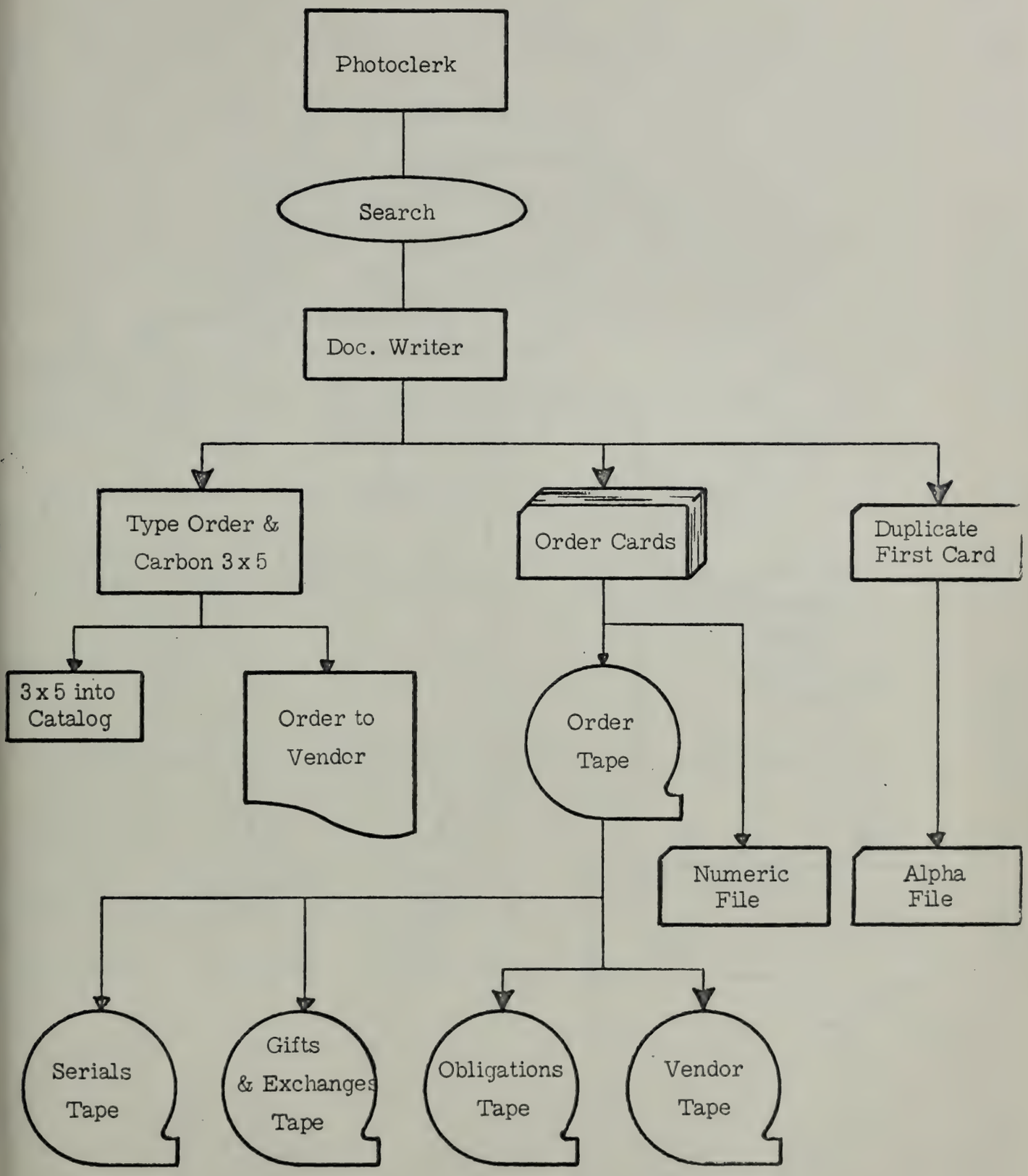
Listings can be run periodically from the in-process tape so that library users can know what is available. Status of processing is thus always known. The vendor tape can supply the information on the orders held by each vendor. The numeric tape or tub file of numeric cards is convenient for checking any specific order.

Instead of a separate in-process tape, the Library may prefer to have a combined on-order and process tape. In that case, rather than having a straight numeric sequence, an adaptation of the Luhn numbering system as used in KWIC could be employed. This arranges the items in alphabetic order and also provides a unique number for each order. Another way would be to have an alphabetic tape in addition to the numeric tape. This, however, would require an additional tape read using the alphabetic duplicate cards.

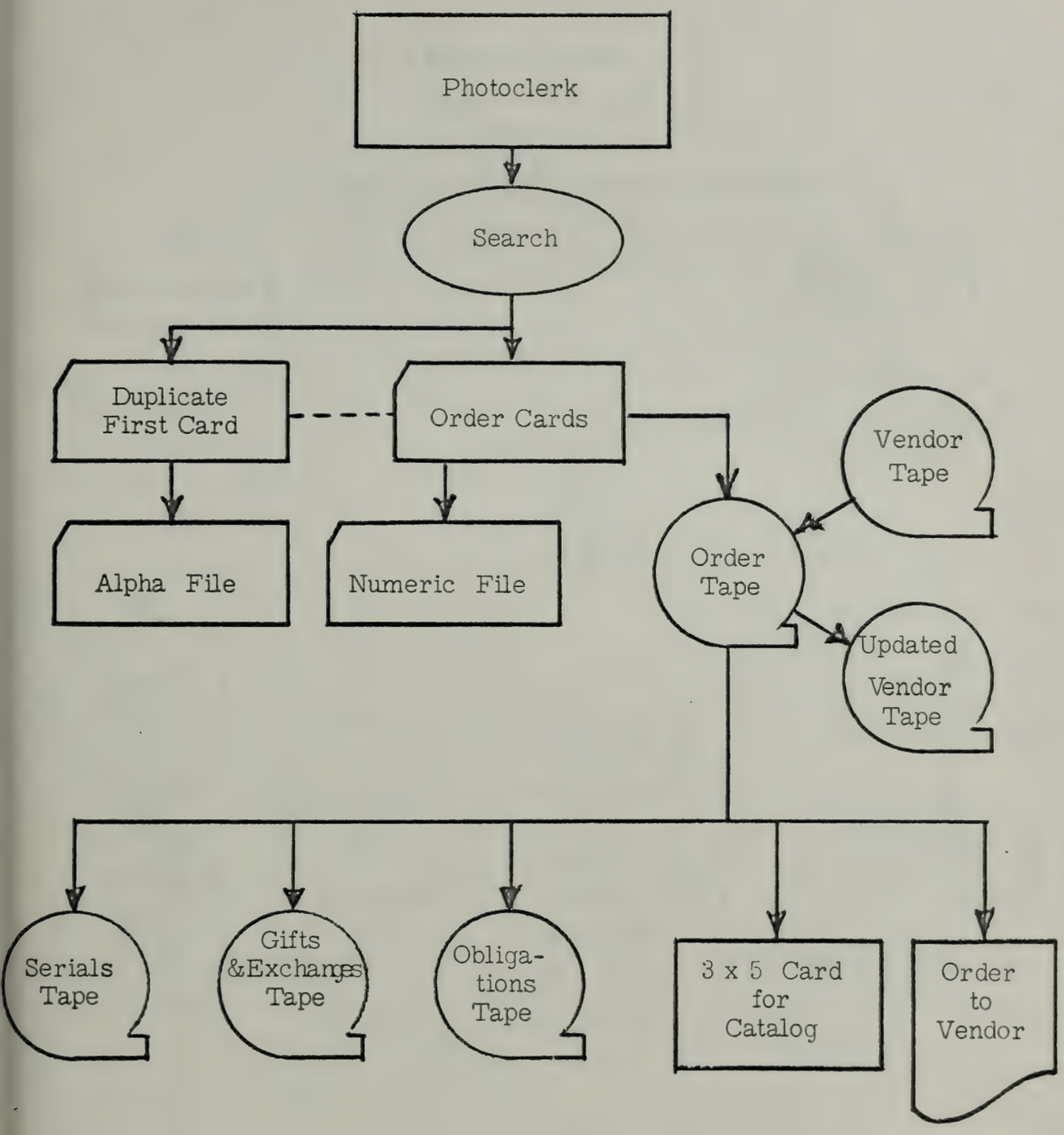
Periodically, the alphabetic duplicate cards are sorted into numeric sequence, the serials cards pulled, and the rest matched in the collator with the numeric cards. Cards that do not match are pulled and the status of the items verified. This is simply a double check on the system and a technique for removing any cards that might have been overlooked.

Priority and special handling items can, of course, be flagged; requestors notified of received items; follow-ups prepared automatically after an expiration date; and any other controls exercised which are deemed necessary.

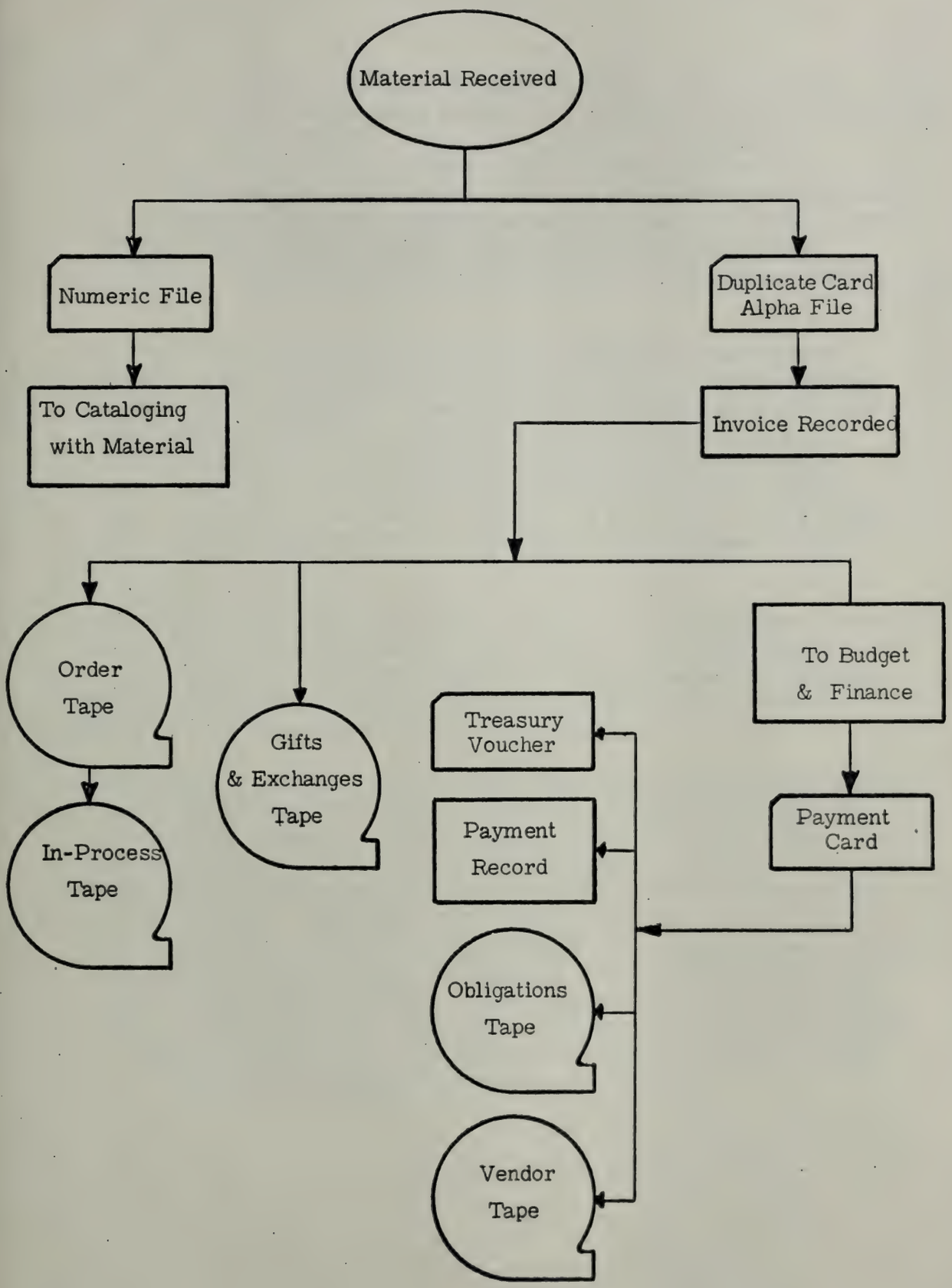
ORDERING


Photoclerk
Search
Doc. Writer
Type Order & Carbon 3 x 5
Order Cards
Duplicate First Card
3 x 5 into Catalog
Order to Vendor
Order Tape
Numeric File
Alpha File
Serials Tape
Gifts & Exchanges Tape
Obligations Tape
Vendor Tape

ORDERING
(ALTERNATE SYSTEM)



RECEIVING


Material Received
Numeric File
To Cataloging with Material
Duplicate Card Alpha File
Invoice Recorded
Order Tape
In-Process Tape
Gifts & Exchanges Tape
Treasury Voucher
Payment Record
Obligations Tape
Vendor Tape
To Budget & Finance
Payment Card

PERIODICALS AND OTHER SERIALS

The NAL, through purchase, gift and exchange, receives over 19,000 different serial titles annually. Through cooperation with the land-grant libraries, NAL will be receiving bibliographic information on additional serials. As the library nationally responsible for the bibliographic control of agriculture publications, the maintaining of serial records is one of the main elements of this control. The B of A, however, cites only a small proportion, probably not more than one quarter, of the journals received by the Library.

Although the Library has a good manual system for checking in serials, it has no ready facility for listing its holdings or printing current lists of journals. New serial titles included in B of A are listed in the individual issues of B of A but cumulations are not published, the list is not complete, nor is it economic to issue special compilations, by subject category for example, of serial titles. It would be desirable, therefore, if the serial record could be stored in a computer which would permit compilation of serial lists in any way desired.

In addition to preparing the desired serial lists, a computer system would also be able to do much of the internal serial processing such as preparing the necessary claims for missing issues and indexes, printing the binding slips, periodically issuing status reports for irregular serials and renewing subscriptions.

In the past, a computer based system for a large collection of serials such as NAL's had to be kept on magnetic tape and processing had to be on a batch basis. Random inquiry could not be accepted. The only way to provide quick status information on a specific title or issue was to have the computer periodically print out listings of the current holdings. Although, such printed lists have the virtue of making the serial records widely available, it is nevertheless not a desirable system, for the information is never completely up to date. Also, for large serial holdings, it is expensive and awkward to use. It is our recommendation, therefore, that the serials records be kept in a random access file. This will permit random posting and real time inquiry as to status of any item in the file.

When a serial is received, a prepunched card, previously prepared by the computer, is pulled from a tub file. If it is a regularly dated issue, the date will already be punched in the card. If it is not, the date will be entered in the card. The card will update the computer record and a double routing slip printed out.

The tub file of prepunched interpreted cards may be prepared monthly by the computer for the issues to be received in the following month. Irregular issues will have a card punched out for the next issue whenever an issue is recorded. It might be practical to have all cards for a year punched at one time. Since this would require the storage of a large number of cards, it may be advisable to keep the card punching on a monthly basis.

For serials on order, a copy of the punched order card (see section on Acquisitions) will be in the tub file. When a new serial is received, this card will, in addition to providing the input for the checking-in procedure, also trigger the necessary cataloging and financial transactions and write the new serials tape. Printed from this tape is the monthly new serials title list.

If a serial is received for which there is no card in the tub file, then it represents an unsolicited acquisition which first must be reviewed before being accepted by the Library.

Since some journal titles are very long and exceed the capacity of a single card, it would be necessary to have trailer cards if the full title is used. Using the journal abbreviation, however, a trailer card should never be necessary. It should be pointed out that the sample serial records shown in this section include only the abbreviated B of A form of the journal title. No provision is made for the full title. If a full title is deemed necessary as is used in the listing of New Periodicals and Serials, then this will have to be included in the original random access record or on a separate tape.

The routing slip can be printed out at the time the issue is received. It would probably be better, however, to have the computer preprint the routing slips at the time the check-in cards are made or on a scheduled monthly basis. Routing information could thus be efficiently stored on tape. Since monthly updating is, no doubt, sufficient for routing records, the updating and printing could be done simultaneously. The slips are printed in pairs, one to serve as the actual routing slip and the other to be the circulation control record.

When a new volume number is recorded, the computer will print out the status of the previous volume and the binding instructions. This status slip will be notification to the binding clerks to assemble the volume for binding and serve also as the actual binding slip. It may even be practical to program the computer to print out a binding slip when all issues and indexes of a volume have been received. This will depend on how well the librarian can anticipate the publishing program of each journal. In any event, an alert when a volume changes number will materially assist the binding clerks in their work. When the binding slip is prepared, a binding card will also be punched. The binding clerks will drop this card into the tub file when the binding is sent out. This will serve as the input record when the bound volume is received.

A serial record could look something like the following:

(1)		(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
01782	Amer. Forests	12	3	1262	04123	8817	BL	1000	02	AB	ENG
	1-8, M9-10, 11-67, B68			69/0301		0302	0403				
	(12) (13)	(12)		(14)	(15)	(16)					

(1)		(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
46422	Lavoura	6	IR	0000	76882	0000	00	7642	01	A	POR
	52-63	64/01-02,		03-04,							
	(12)	(15)	(16)								

(1) Journal number - 5 digit number, equally distributed over present holdings.

(2) Frequency

(3) Date due

(4) Expiration date, month and year

(5) Vendor code - 4 digits (Purchased journals are identified by language, not country of origin. If a geographic code is desired, this number can be expanded.)

Exchange Code - 5 digits, the first two signifying geographic area.

(6) Binding color and material, 0000 means not bound

(7) Lettering color

(8) Price or exchange material

(9) Number of copies

(10) Location - standard letter symbols used by NAL

(11) Language

(12) Volumes in library

(13) M = Volumes missing

(14) B = Volume at bindery

(15) / current volume

(16) Issues received day and month (Can have multiple records for multiple copies.)

(17) No item 17 is shown on the sample records but it may be advisable to include a signal for those journals which are to be reviewed for B of A.

Only journal title abbreviation is shown. If full title is needed, it may be kept here or on a separate tape.

The serial identification number (item 1 on the serial record) is shown as a 5 digit number. Distributed evenly over the present holdings, this would allow for normal expansion, assuming that the present large holdings will give a good alphabetic spread. However, to be on the safe side, it would probably be advisable to allow larger gaps between numbers. A 6 digit number would allow a gap of about

50 vacancies between assignments. An alpha-numeric scheme, where the alphabetic character corresponds to the initial letter of the first word of the title followed by 5 digits would allow, on an average, 100 vacancies between assignments. If copy number is to be shown in the serial identification number, then two additional digits should be added. These terminal digits are to be dropped or ignored when processing for serial titles.

The records up to the language designation are fixed field records and therefore can be readily extracted and acted on as needed. The information which will be printed in serial lists, etc., follows the fixed field records up to the slash / the current volume. If a union list of serials is issued which will include the holdings of other institutions, then the name of the institution can follow the last volume designation. (The slash does not print; it is used as a stop signal.) In addition to the journal title, a record would print items 11 through 14 plus name of institution holding the title. It may be desirable to edit out the B (item 14) for volumes at the bindery.

With an average record length of 150 characters and spaces and allowing for 20,000 records, the total serial file will probably equal about 3 million characters. This figure includes about 100,000 characters for the necessary see references for journals which have changed title.

There would be a separate vendor tape arranged by vendor number, giving his name and address and listing the journals (code number and quantity) he supplies and the price of each.

There would also be a separate exchange and gift tape arranged by exchange code number. This number could be made meaningful by having the first two digits signify the geographic breakdown used by the Library.

The serial file will be read periodically - once a week or twice a month - and all claims for missing issues written on a work tape. The claims will be sorted into vendor sequence and then matched with the vendor tape to print out the actual claims. Since the vendor address is printed on the form, the latter need only be folded with address out or slipped into a window envelope for mailing. At the time the claim is prepared, a punched card will also be prepared for

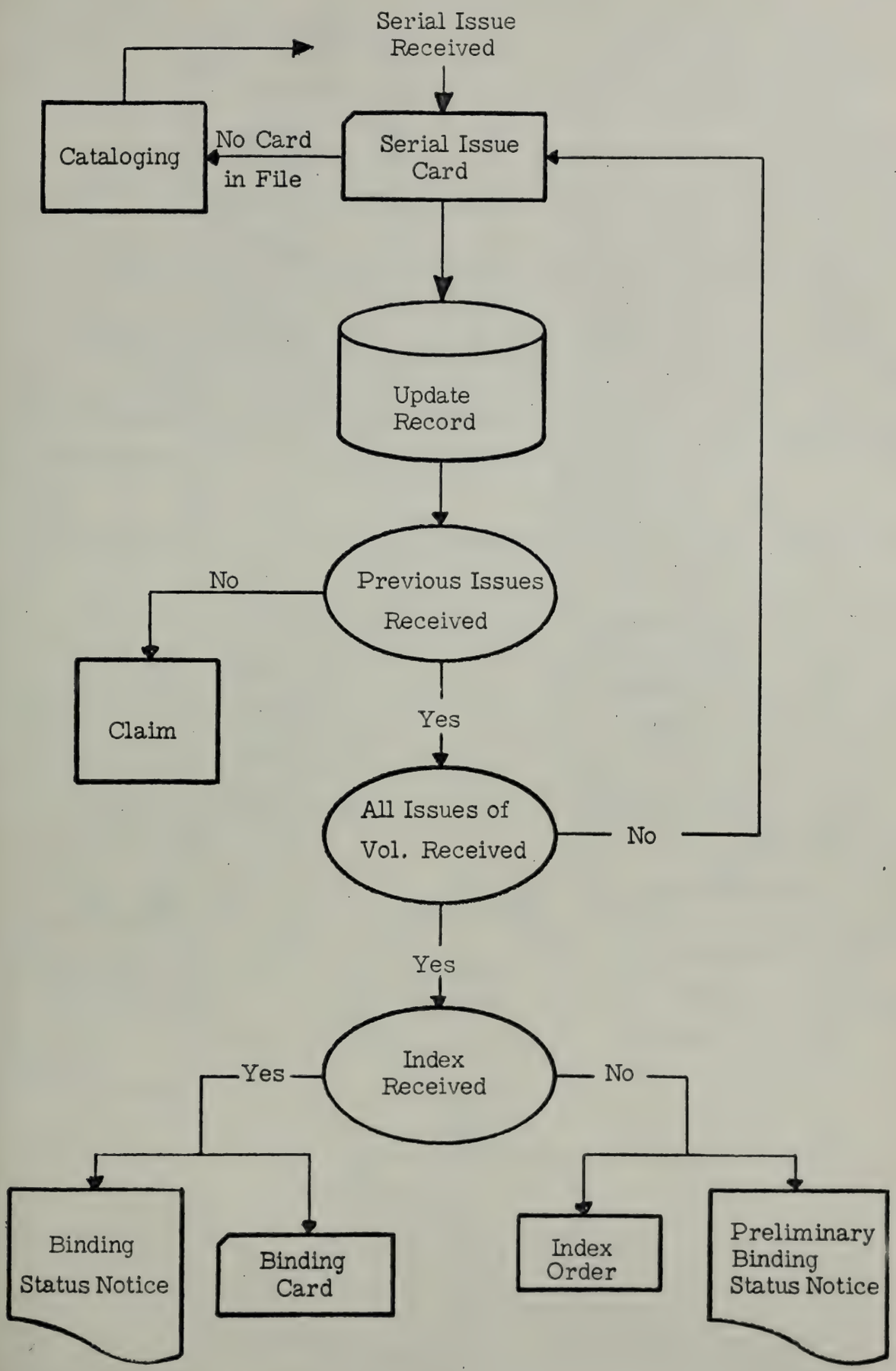
the checking-in tub file for each issue claimed. This will replace the regular check-in card and will thus be a flag that a claim has been made and will show the date of the claim. In order to prevent multiple claims for the same issue, the work claim tape will be kept for matching with the next claim tape and all duplicates cancelled. It will probably not be necessary to keep a record for possible follow-up or second claims, because during the regular read of the file, a follow-up claim can be prepared for all items which have exceeded a certain time span. If a follow-up record is desired, then the duplicates which have been found when the two succeeding claim tapes have been matched, can be written on a third tape. Periodically this can be read against the total file to pull out all items received and follow-up claims written for the remainder.

There are several ways of determining if an issue is considered missing and a claim should be prepared:

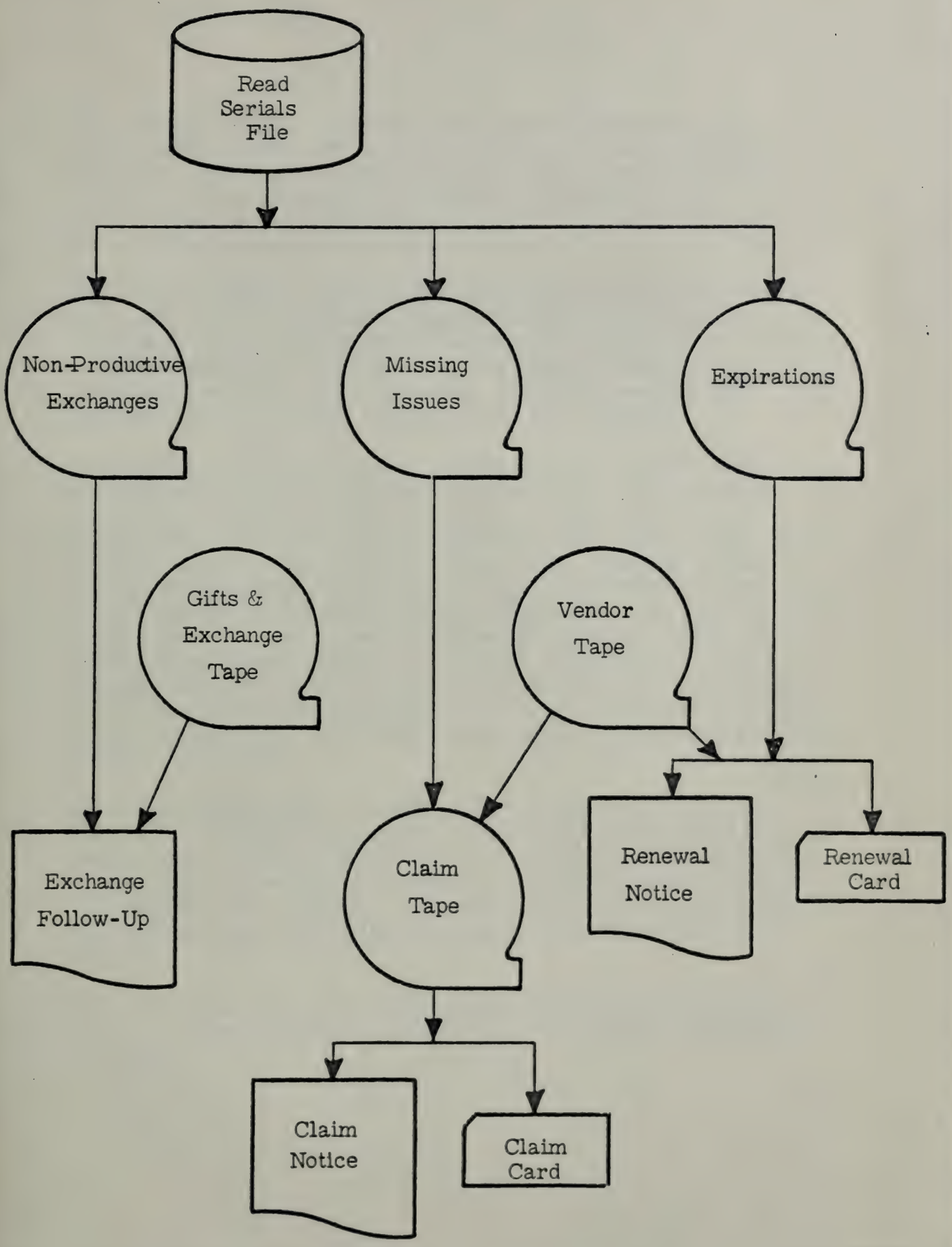
1. Claim when an issue is skipped
2. Claim when an issue is not received by a fixed date Item 3 on the sample serial record, shows that the journal Amer. Forests should be received by the 3rd of the month (date of issue). If this date has been exceeded, a claim is written.
3. Claim by formula based on interval between receipt of previous issues. The computer calculates the average interval between previous receipts of a title. To this is added a small factor to allow for holidays, longer months and other possible delays. During the claim read cycle, this interval number is added to the last date and if the total is less than the current date, then a claim is written.
4. Irregular serials would be written out quarterly or annually for review. This write-out may be limited to titles not received during the previous quarter or year.

During the claim read cycle the computer will also be scanning for expirations and will write out renewals. Similarly, and at the same time, the exchanges can be monitored and non-productive exchanges properly flagged.

SERIALS CHECK-IN AND BINDING



SERIALS INVENTORY



CIRCULATION

The present circulation methods used by the Library are very simple and efficient. Only a minimal record is kept. Overdues take about 2-1/2 hours a week and there does not seem to be any great need for keeping detailed records by borrower. Book cards are not used and every effort is made to have the borrower make out the request or transaction card.

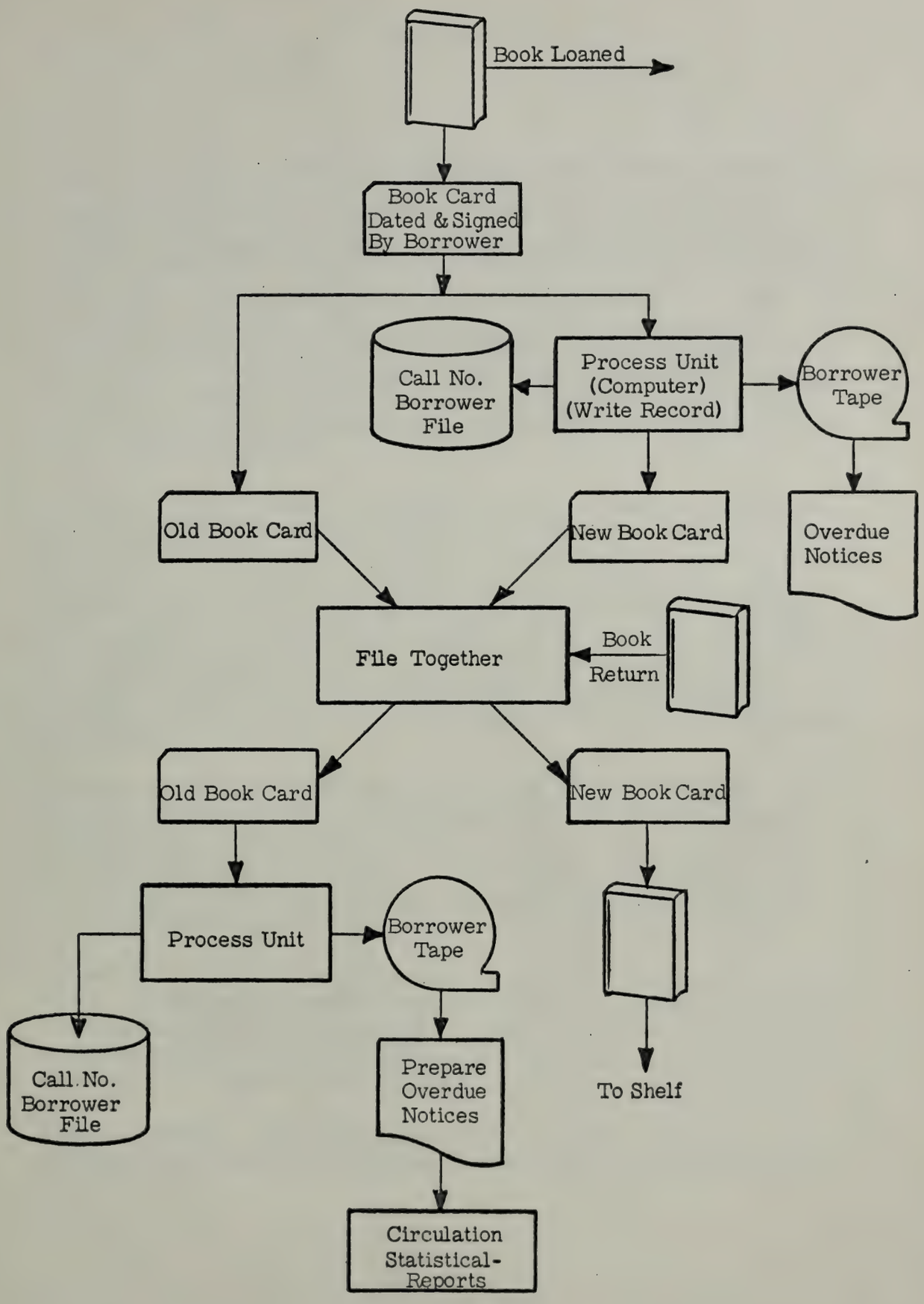
A computer program could prepare book cards, prepare borrowers' lists, and send out overdues. Tighter controls and statistical information could be provided. The computer system would, however, be more expensive. It is our recommendation, therefore, that circulation be continued as at present, to be reviewed at a later date after the more urgent problems have been worked out.

If, however, greater circulation control is needed, a very simple but effective circulation system can be designed. Essentially, an extra card is made during the cataloging process. This has the call number, plus the first few words of the main entry. Room is left on this card to record borrower and date. When the book is loaned, the borrower signs the card. Daily, the borrower identification and date are punched into the cards and the cards read into the computer. If the number of outstanding loans are not too large, a single tape record arranged by borrower is sufficient. If the outstanding loans are very extensive, it would probably be advisable also to have an item record, that is, a file arranged by call number. If very rapid access to this record is needed, it should be in a random access file.

As the loan is recorded, a new book card is punched by the computer. This new card and the old book card are returned to the loan desk where they are filed by call number. When the book is returned, the new card is slipped into the book and the old card is returned to the computer to clear the record. The cards at the loan desk are also used to identify where a charged-out item is located.

From the borrowers' tape are prepared overdues and termination notices. The returned cards can furnish the necessary circulation statistics.

CIRCULATION SYSTEM



CATALOGING

A fully mechanized catalog can offer many aids to the cataloger. Much of the look-up verification that the cataloger presently does to check author entries, book numbers, forms of corporate entries, tracings for previous editions, establishment of added copies and a host of other detail verifications that involve checking the shelf list and author entries, can readily be done by the computer. These all presuppose, however, that a complete shelf list, and author and subject catalogs are stored in the computer. There are, however, other tasks in which the computer can assist the cataloger from the beginning. These include the actual printing of catalog cards and book catalogs, and the editing and printing of subject authority lists and corporate headings.

If there is to be coordination between the B of A and book cataloging, one of the first tasks should be the establishment of a uniform subject heading list. As the B of A indexes are built up, the computer will be storing all the tracings. These can be listed without the citation addresses and serve as the subject heading authority list. The see and see also references can be inverted by the computer to produce all the refer froms. In addition, the computer will record the frequencies with which each entry is used, giving the cataloger a measure of usage and providing an editing control for the assignment of headings.

Authority lists can be printed out at any time and the "chains" or linkages between headings printed separately. Records are kept automatically showing which headings are searched by the library clientele and which are ignored. Tighter control of headings, the carrying of less deadwood and the guarantee that all referrals lead to actual entries and not into blind alleys are all made possible.

An authority list of corporate entries can also be maintained on tape which will include all variants of a corporate body as see references. The machine will be programmed to accept only recorded entries and to reject any new corporate entry until it has been formally recorded. Similarly, the machine will reject any duplicated shelf list number.

With a computer, cataloging will proceed much as at present. The incoming item with the acquisition punched cards and, if desired, a

printout of these cards will be given to the descriptive cataloger who will edit the original acquisition record. Classification and Cutter numbers will be applied and the material given to the subject catalogers. The assumption is that the subject cataloging and the B of A indexing will be identical. If it isn't, double handling, as at present, may be necessary. As noted in the section on the B of A, in addition to the regular tracings, additional descriptors may be added to provide for deep indexing. These descriptors will not be printed in the catalog or B of A index but they can be searched in the computer for reference, bibliographic work

Once the catalogers have completed their work, the item will be entered on the bibliographic tape as a B of A citation and purged from the in-process tape. The title will also be entered on a catalog tape where, in addition to the bare citation, a full entry, including all the information normally carried on the shelf list and main entry, will be provided. From this will be printed the catalog cards and/or book catalog and, if desired, an accession list.

The basic elements which go to make up a catalog card will be identified. These include such catalog card elements as the main entry, title, additional authors (including editor, translator, compiler, etc.), place, publisher, date, language, collation and notes. This bibliographic string need not have each specific element identified but only the class or type of element. The purpose of this identification is to control the printing format and edit the output and is not meant to be a descriptor. For example, these identifications can be used if a requestor specifies that he wishes references only of a certain date or only in certain languages. The system should not be over-designed in order to provide uncalled-for services which increase input costs without commensurate utility.

The catalog tape could be in shelf list order, the shelf list number serving as the unique address of the title. Or it could be in main entry order. Updating these tapes, however, involves more effort than using a purely sequential number such as the B of A citation number. It may be preferable, therefore, to use the B of A number as the storage address. Assuming that the B of A sequence is considered the main entry or catalog tape, then the other tapes: Shelf list, author, subject heading and, if desired, title and part title, will individually carry the file entry, that is, the shelf list number, or author, or subject heading, or title, etc., and the address, B of A number, only. The full entry will appear only on the catalog tape.

The computer offers a large variety of outputs from the same bibliographic record. From the entries stored, one can produce:

1. Standard catalog cards
2. Standard book catalog with separate sections for author, subject heading, book number and title
3. Permuted title index
4. Permuted subject heading index
5. Combined permuted title and subject heading index
6. Descriptor tapes or Uniterm cards.

Rather than making any a priori decisions, it would be advisable first to make only catalog cards and produce, experimentally, a variety of outputs to be tested with the Library staff and clientele. The main thing is that the bibliographic record be recorded in its entirety and in open language as it is now on the printed catalog card. Whatever future decisions are made as to the arrangement or use of this information, the record will never have to be transcribed again.

A computer catalog also simplifies the problem of location control or shelving. Large libraries today find it difficult to maintain their collection by strictly class arrangement. More and more it is becoming necessary to keep portions of the collection in storage facilities and to shelve tight. Where parts of the collection have to be removed from their regular position and stored elsewhere, it is very simple to change the record — a single gang punch in the original punched cards will usually suffice.

Purging, weeding and updating are also simplified. All records of an item can be expurgated or changed without the laborious task of trying to trace each entry in the catalog.